

SCIENCE-IX

MODULE - 4

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DIVERSITY IN LIVING ORGANISMS

INTRODUCTION

Biodiversity refers to all the diverse plants, animals and microorganisms present on earth.

Biological diversity or biodiversity is the occurrence of diverse or varied forms of living beings which differ from one another in external appearance, size, colour pattern, internal structure, nutrition, behaviour, habitat, etc.

They range in size from microscopic bacteria, hardly a few micrometers in size, to Blue Whale (about 30 m in length) and Redwood trees (***Sequoia***) of California (about 100 m in height). Similarly some pine trees (e.g. ***Pinus***) live for thousands of years while many insects like mosquitoes have a life span of a few days. There are transparent jelly fishes and worms on one hand to brightly coloured birds and flowers on the other hand.

It is estimated that there are at least 10 million different species of plants and animals living today, but only 1.7 million have been described so far worldwide.

On your Tips

Term "Biodiversity" was coined by "**Walter G. Rosen**" in 1986.

Megadiversity : The warm and humid tropical regions of the earth between the tropic of Capricorn and the tropic of Cancer, are rich in diversity of plant and animal life. This is called the region of "**megadiversity**".

There are **12** megadiversity centres in the world, which are rich in biodiversity.

Countries are - **Brazil, Colombia, Ecuador, Peru, Mexico, Zaire, Madagascar, Australia, China, Indonesia, Malaysia** and **India**.

CLASSIFICATION

Classification is the arrangement of organisms into groups and subgroups on the basis of their similarities and dissimilarities.

COMPETITIVE WINDOW

Taxonomy : The science dealing with identification, nomenclature and classification of organisms is called **taxonomy** or **systematics**.

Term "Taxonomy" was given by → **A.P. de Candolle**

Father of Modern Taxonomy → **Carolus Linnaeus**

Importance of classification :

The bewildering variety of life around us has evolved on earth. In order to make relevant groups to study, variety of life forms, we classify organism.

Classification makes the study of different type of organisms easy and systematic.

From classification, we can know all life forms together and as a whole.

Classification reveals the inter-relationship among organisms.

It helps in understanding the other branches of life sciences.

Hierarchy :- Hierarchy is a system of classification into which taxonomic categories are arranged in descending order.



Category :- Plants and animals are ranked in an arrangement of known categories. Such as Kingdom, Phylum (for animals) or Division (for plants), Class, Order, Family, Genus and Species.

Taxon :- Taxon is defined as a unit of classification of organisms which can be recognised to a definite category at any level of classification e.g. fishes, insects etc.

Kingdom → Largest Group

Phylum (for animals) / Division (for plants)

Class

Order

Family

Genus

Species → Lowest group

	Categories	Features
1	Species	A group of organisms capable of interbreeding to produce fertile offspring. It is the lowest category of living organisms. Species includes a group of individuals which resemble closely in structure as well as functions.
2	Genus	It is a group of closely related species with common ancestry e.g. potato and brinjal are placed in same genus <i>Solanum</i> but are different species.
3	Family	A number of genera having several common characters form a family e.g. <i>Solanum</i> and <i>Datura</i> have been placed in same family Solanaceae .
4	Order	A number of families having common characters are placed in Order e.g. Ursidae (Bears), Canidae (dogs, wolves, etc.) and Felidae (cats, tiger, etc.) belong to same Order Carnivora .
5	Class	Similar orders are placed together in a Class. Class Mammalia includes order like Carnivora, Chiroptera, Primata and Rodentia.
6	Phylum (or Division)	Many classes with some common characters are included in Phylum, Phylum Chordata includes classes like Pisces, Amphibia, Reptilia, Aves and Mammalia.
7	Kingdom	It is the highest category of taxonomic studies. All animals are included in kingdom Animalia and all plants are included in kingdom Plantae .

CLASSIFICATION AND EVOLUTION

Charles Darwin first described the idea of evolution in 1859 in his book, "**The Origin of Species**".

Darwin suggested that organisms are related to each other by descent. They had common ancestors from which they gradually evolved into their present form.

The ancestral forms were simple and are called '**primitive**' and primitive organisms have evolved into **advanced organisms** which are more complex.

This process of gradual change from simple life forms to complex life forms is called 'Evolution'.



NOMENCLATURE : (The naming of organisms)

Binomial Nomenclature : Binomial nomenclature was proposed by **Carolus Linnaeus**. According to him the name of any organism consists of two words.

The first word denoting the name of '**genus**' and second word denoting '**species**'.

First letter of **generic name** must be written in **capital letter** whereas **species name** is started with **small letter**.

Scientific name is generally derived from **Greek** or **Latin** words.

The binomial names are printed in **italics** and **underlined separately** when written.

Examples :

Potato - ***Solanum tuberosum*** Tiger - ***Panthera tigris***

BIOLOGICAL CLASSIFICATION :

Artificial system : It based on habit, habitat and a few morphological characters.

e.g. **Aristotle** classified living organisms on the basis of habitat into water, land and air.

Theophrastus grouped plants on the basis of their habits into trees, shrubs, undershrubs and herbs.

Natural Systems : It based on natural affinities.

e.g. **Bentham** and **Hooker's** classification of seed plants.

Phylogenetic Systems :

Based on evolutionary relationships of organisms.

e.g. **Engler** and **Prantl's** classification of flowering plants.

KINGDOM SYSTEMS

1. Two Kingdom Classification :

First suggested by **Carolus Linnaeus** in 1758.

Living organisms have been divided into two kingdoms.

COMPETITIVE WINDOW

Three Kingdom Classification : Proposed by **Ernst Haeckel** in 1886. He suggested a third Kingdom - Protista for unicellular organisms.
Four Kingdom Classification : Given by **Copeland**. He included Kingdom-Monera (Mychota) for prokaryotes.

- (i) **Kingdom Plantae** - All the plants constitute kingdom plantae. The kingdom includes bacteria, lichens, fungi, algae, bryophytes, ferns, gymnosperms and angiosperms.
- (ii) **Kingdom Animalia** - All the animals constitute kingdom animalia. The kingdom animalia includes protozoans, sponges, Hydra, Jelly Fish, worms, insects, spiders, octopus, star fish, fishes, frogs, salamanders, lizards, snakes, birds and mammals.

Drawbacks in two kingdom classification :-

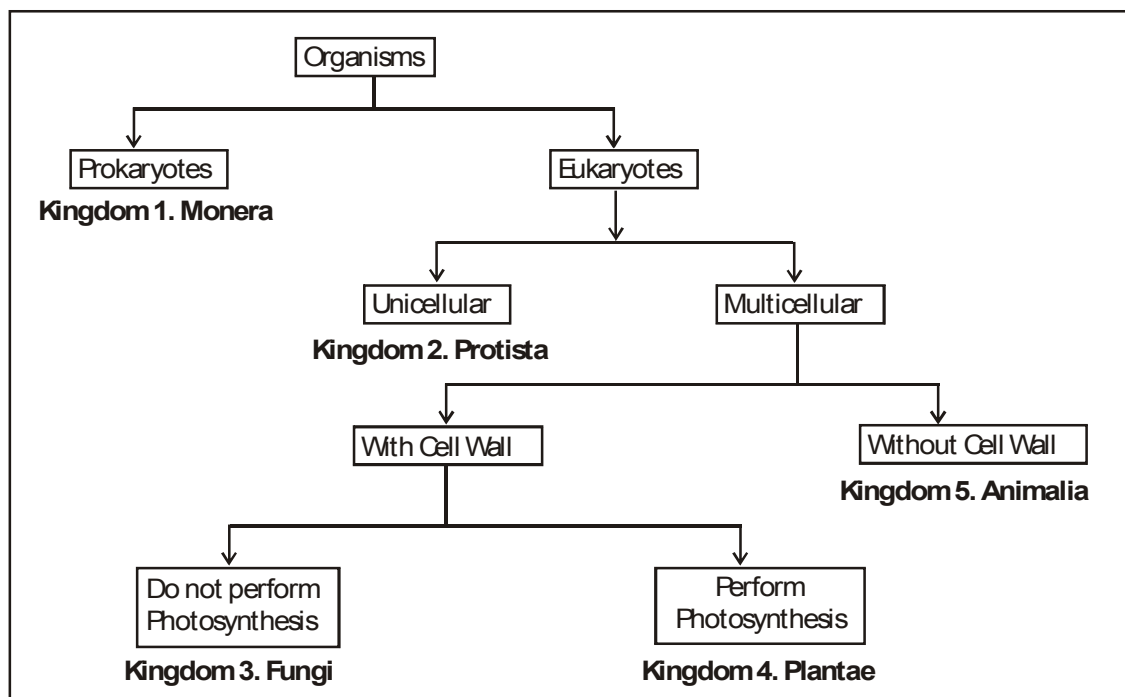
Certain organisms did not strictly fit either under plant or animal kingdom like : *Euglena* and Viruses.

Five kingdom classification :

This concept was propounded by **Robert H. Whittaker** in 1969.

On the basis of **cell structure**, **complexity in organisms** and **type of nutrition**, he divided living organisms into 5 kingdoms. (i) Monera, (ii) Protista, (iii) Fungi, (iv) Plantae, (v) Animalia.





Carl Woese (1977, 1994) has divided the kingdom monera into archaebacteria (= archaea) and eubacteria (or bacteria). All other kingdom are included in his superkingdom of eukarya.

Practice Zone - 1.1

- Who is the father of modern taxonomy ?
- What is the basic unit of classification ?
- Who wrote "The origin of species" ?
- Name the book which was written by Carolus Linnaeus.
- Give the scientific name of tiger.
- Who was the founder of trinomial nomenclature ?
- Who gave five kingdom classification ?
- What is the basis of artificial classification system ?

CHARACTERISTIC OF FIVE KINGDOMS

1. Kingdom - Monera :

Prokaryotic Nature : The genetic material is not organised into a nucleus. It lies directly inside the cytoplasm and is called nucleoid.

Membrane Bound Cell Organelles. Membrane bound cell organelles like mitochondria, Golgi apparatus, plastids, lysosomes, are absent.

Unicellular Nature : Monerans are basically unicellular.

In filaments and colonies the cells are similar and independent.

Mode of nutrition is either **autotrophic** (Blue-green algae) or **heterotrophic** (*Mycoplasma* and most bacteria).

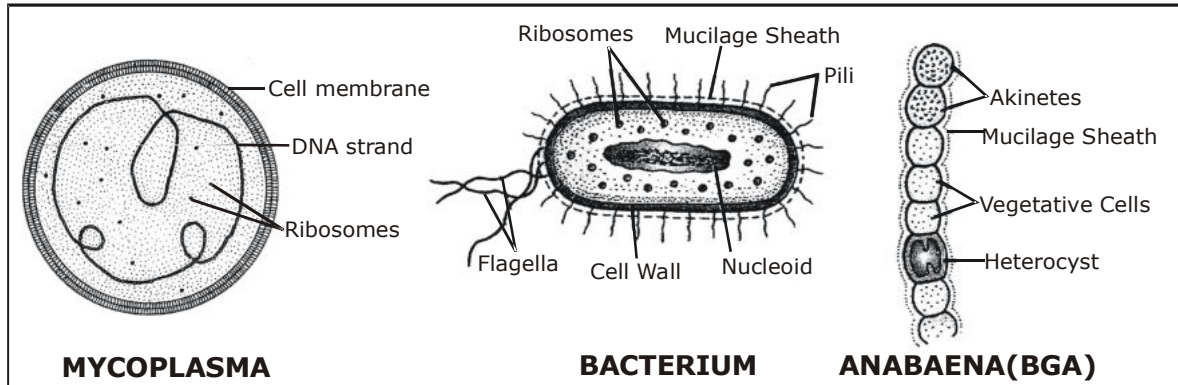
Some organisms have **cell wall** (in bacteria) while other lacking (in *Mycoplasma*).

COMPETITION WINDOW

Nitrogen Metabolism : All nitrogen fixing organisms belong to monera (e.g., *Rhizobium* in root nodules of legumes). Some monerans take part in ammonification, nitrification and denitrification.

Blue green algae performs nitrogen fixation due to the presence of heterocyst. cell wall of bacteria is made up of peptidoglycan (Murein).





Examples :

Blue Green Algae (Cyanobacteria) – **Anabaena, Nostoc.**

Bacteria – (**Vibrio cholerae, Clostridium botulinum, Escherichia coli**)

Mycoplasma – (Produces diseases in humans, animals and plants).

2. Kingdom - Protista :

Organisms are **unicellular, eukaryotic** organization.

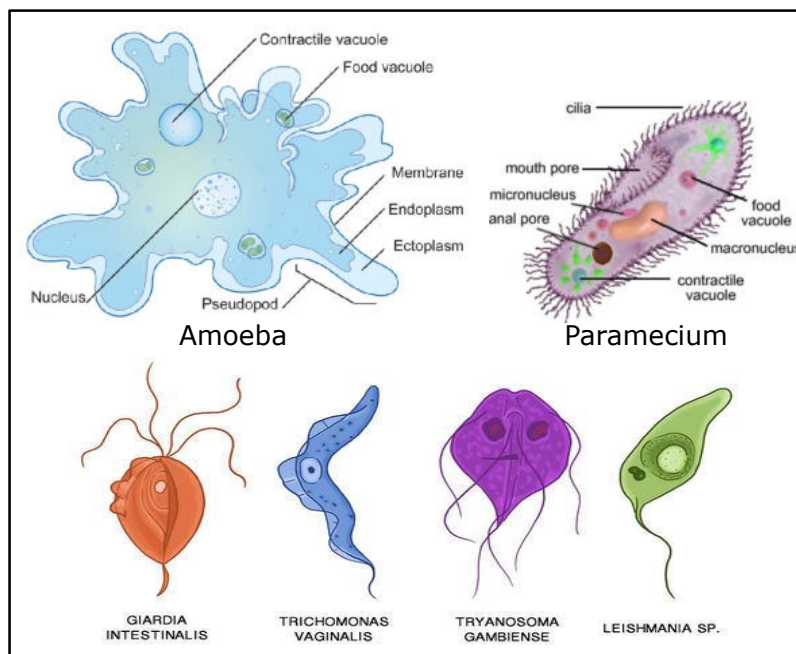
There is a true nucleus and membrane bound other cell organelles.

Cell wall : Some protists are covered with cell wall (most photosynthetic protists) while others do not possess it (e.g., protozoan protists).

Mode of nutrition is either **autotrophic** (algae and diatoms) or **heterotrophic** (protozoans).

Some organisms have **cilia** (e.g. *Paramecium*) ; **flagellum** (e.g. *Euglena*) and **pseudopodia** (e.g. *Amoeba*) for locomotion.

Sexual reproduction is present but an embryo stage is absent.



Examples :

Unicellular algae – **Chlamydomonas, Chlorella**

Diatoms – **Pinnularia, Navicula**

Dinoflagellates – **Gonyaulax, Noctiluca**

Protozoa – **Amoeba, Plasmodium, Euglena, Paramecium**



COMPETITION WINDOW

Photosynthetic nutrition occurs in unicellular algae (e.g., dinoflagellates, diatoms) and *Euglena* like organisms. They are the major producers of aquatic systems.

Holozoic nutrition is animal like nutrition where solid food particles are ingested. It is found in protozoan protists.

In absorptive nutrition, liquefied digested food is absorbed. It occurs in parasites and saprophytes.

Euglena and its relatives perform photosynthesis in light. In dark and in the presence of organic matter, they switch over to saprophytic nutrition. Such a dual nutrition is called mixotrophic nutrition. Organisms with mixotrophic nutrition are called plant-animals.

3. Kingdom - Fungi

These are **non-green** (lacking chlorophyll) **eukaryotic**, organisms.

They may be unicellular (e.g. Yeast) or Multicellular (most fungi).

The body of a multicellular and filamentous fungus is called **mycelium** and is composed of several thread like structures termed as **hyphae**.

Heterotrophic mode of nutrition is found.

Food is gained by either **saprophytically** (from dead organic matter) or **parasitically** (from other living tissues).

Cell Wall contain - **Chitin**.

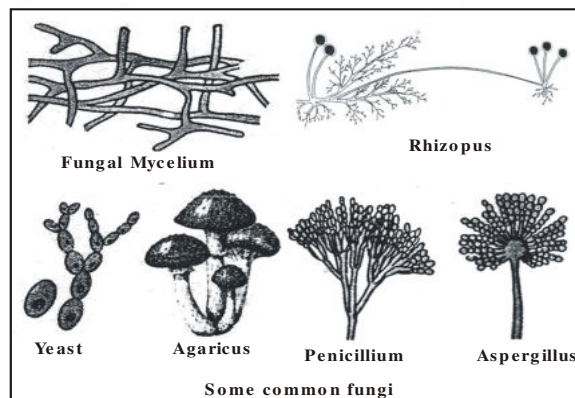
Reserve food material - **Glycogen**.

COMPETITIVE WINDOW

Fungi are heterotrophic with absorptive nutrition. Most of them are decomposers (hence kingdom of multicellular decomposers) or saprophytes which feed on organic remains by first secreting digestive enzymes and then absorbing the digested materials. A few fungi are also parasitic.

Fungi show progressive reduction in sexuality. An embryo stage is absent.

Examples : Yeast, *Rhizopus* (Bread mould), *Penicillium*, *Mucor*, Mushroom (*Agaricus*) ; Smut (*Ustilago*).



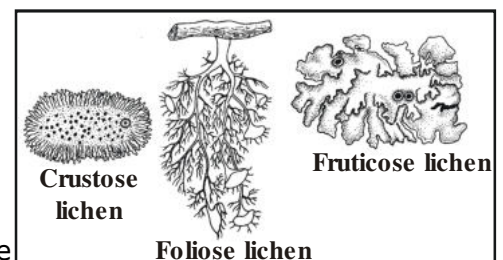
DO YOU KNOW ?

LICHEN - Symbiotic association between algae and fungi.

Algal component is known as "**Phycobiont**" and fungal component is called "**Mycobiont**".

The alga manufactures food not only for itself but also for the fungus. Fungus provides protection to alga, helps in fixation and absorption of water as well as minerals.

They are a source of essences, dhuup, havan samagri and some medicines.



Examples : Crustose lichen - *Rhizocarpon*
 Foliose lichen - *Parmelia*
 Fruticose lichen - *Usnea*

4. Kingdom - Plantae

Plants are multicellular, eukaryotes with cellulosic **cell wall**.
 They are autotrophs i.e. prepare own food by photosynthesis.

5. Kingdom - Animalia

Animals are multicellular, eukaryotes without Cell Walls.
 They are heterotrophic.

Practice Zone - 1.2

- | | |
|--|--|
| 1. Who proposed 5-kingdom classification ? | 2. What is monera ? |
| 3. Give two examples of monera. | 4. What is protista ? |
| 5. What is mixotrophic nutrition ? | 6. Give one example of protozoan protistan. |
| 7. Give one example of algal protists. | 8. Which one is called plant animal ? |
| 9. What are fungi ? | 10. What is mycelium ? |
| 11. What is chemical characteristic of fungal cell wall ? | 12. Give two examples of fungi. |
| 13. What is lichen ? | 14. Give one use of lichen. |

KINGDOM - PLANTAE

Characteristics : Plantae includes multicellular, eukaryote organisms with cellulosic cell wall.
 A mature plant cell commonly possess a single large central vacuole.
 Plastids are found in all plants. Some plastids posses photosynthetic pigment. They are called chloroplasts.
 Plants are autotrophic in nature because they are able to perform photosynthesis with the help of chlorophyll present in chloroplasts. Reserve food is starch.

Eichler (1883) divided the kingdom plantae into two subkingdoms, cryptogamae and phanerogamae.
 Subkingdom : Cryptogamae (Gk. cryptos – hidden, gamous – marriage). The reproductive organs are inconspicuous. Flowers and seeds are absent. The embryo, if present is naked. Plants of subkingdom cryptogamae are also called lower plants, flowerless and seedless plants. There are three divisions in this subkingdom – Thallophyta, Bryophyta, Pteridophyta.
 Subkingdom Phanerogamae (Gk. phaneros – visible, gamous – marriage). The plant which possess visible and well differentiated reproductive organs are called phanerogams. The plants of subkingdom phanerogamae have well differentiated and evident reproductive organs like flowers or cones, they are also called as seed plants as they beared seeds. Phanerogamae has single division of spermatophyta.

	Cryptogamae	Phanerogamae
1	It contains seedless plants.	It contain seed plants.
2	It has both vascular and nonvascular plants.	It possesses only vascular plants.
3	An external water is required for fertilization.	An external water is not required.

Basis of Classification

On the basis of differentiation of plant body.
 On the basis of conducting tissue.
 On the basis of ability to bear seeds and if seeds are enclosed within the fruits.
 Following plant groups are included in kingdom-Plantae

- | | |
|-----------------|-------------|
| 1. Thallophyta | Cryptogams |
| 2. Bryophyta | |
| 3. Pteridophyta | |
| 4. Gymnosperms | Phanerogams |
| 5. Angiosperms | |



1. Thallophyta

Main plant body is gametophyte (haploid).

Plant body is not differentiated into root, stem and leaves, and is called as thallus.

These are found in marine, fresh water and moist land.

They do not have mechanical and conducting tissue.

Asexual reproduction generally takes place by spores.

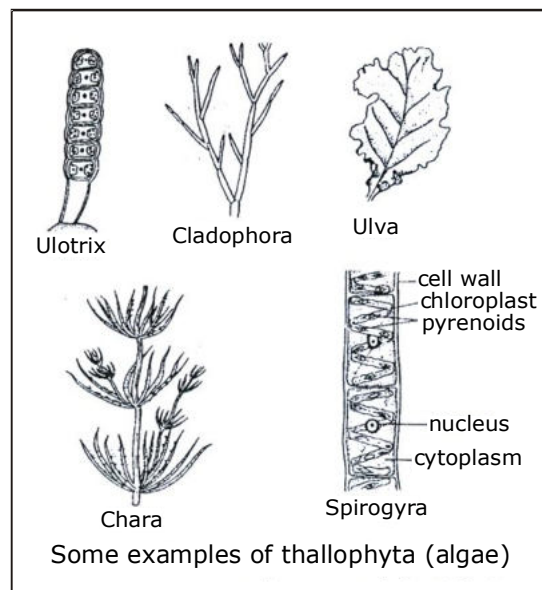
Sex organs are simple, single-celled, (the male sex organs are called as antheridia and female sex organ are called oogonia) and there is no embryo formation after fertilization.

Examples :

Green algae - ***Spirogyra, Ulothrix, Cladophora, Chara, Ulva, Chlorella***

Brown algae - ***Laminaria, Fucus, Sargassum***.

Red Algae - ***Polysiphonia***



	Algae	Fungi
1	Photosynthetic pigments are present.	Photosynthetic pigments are absent.
2	Algae are autotrophic.	Fungi are heterotrophic.
3	Most of the algae are aquatic.	Most of the fungi are terrestrial.
4	The cell wall is made up of cellulose.	The cell wall is made up of chitin.
5	Algae contain starch as a stored food material.	Fungi contain glycogen and oil as a stored food material.

*Gametophyte is haploid (with one set of chromosomes) plant body which produces gametes directly.

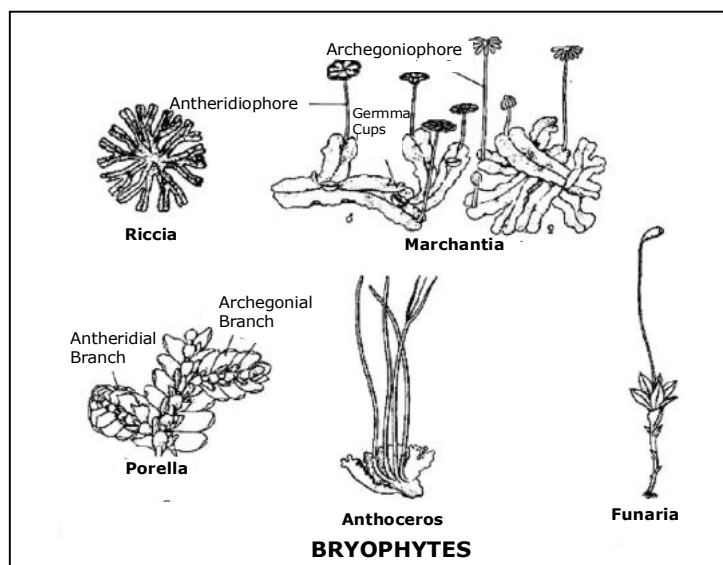
*Sporophyte is diploid (with two sets of chromosomes) plant body which produces haploid spores through the process of meiosis. Sporophyte is formed from diploid zygote, after the fusion of spores.

2. Bryophyta

Bryophytes are also known as amphibians of plant kingdom.

These are the simplest and the most primitive land plant.

They have flat plant body which differentiates into stem and leaf like structure.



Main plant body is gametophyte which attach to substratum by means of rhizoids.
Sex organs are multicellular and jacketed. Male sex organs are called antheridia while female sex organs are called archegonia.

Examples :

Liver wort - *Riccia and Marchantia*

Horn wort - *Anthoceros*

Moss - *Funaria*

3. Pteridophyta -

Main plant body is sporophyte which is differentiated into root, stem and leaves.

Vascular tissues, xylem and phloem, appear for the first time in pteridophyta.

They produces spores inside sporangia.

Gametophyte is a small but independent stage in life cycle.

Sex Organs are multicellular and jacketed like those of bryophytes – male antheridia, female archegonia.

Male gametes need water for fertilization.

Seeds are absent.

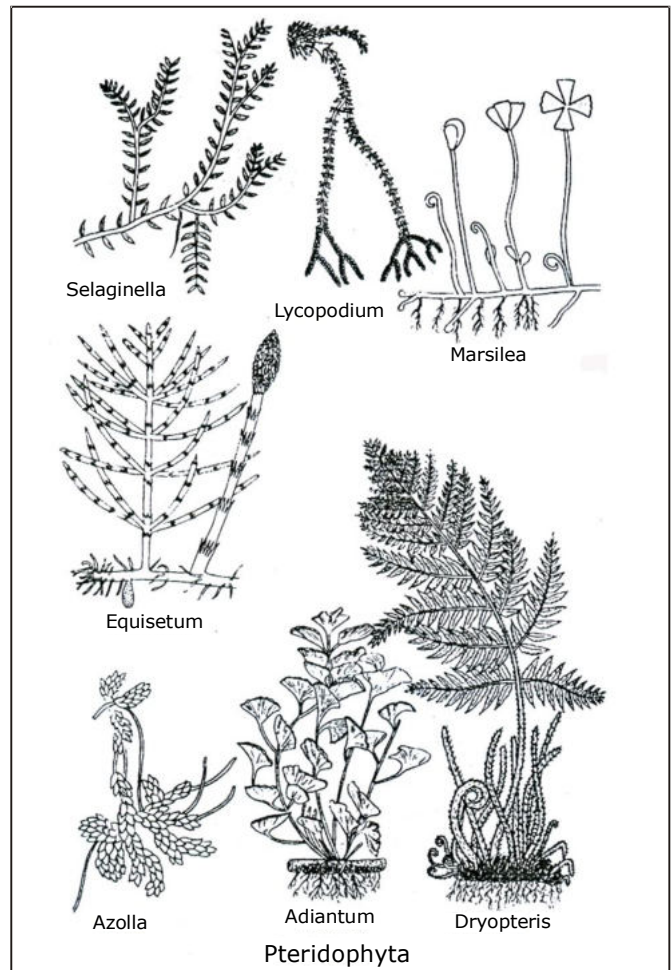
Examples :

Club moss - *Selaginella, Lycopodium*

Horse tails - *Equisetum*

Ferns - *Marsilea, Azolla, Adiantum,*

Dryopteris, Pteris and Pteridium.



Differences Between Bryophyta and Pteridophyta		
	Bryophyta	Pteridophyta
1	Main plant body is gametophytic.	It is sporophytic.
2	True stem and true leaves are always absent.	True stem and true leaves are present.
3	Fixation is carried out by rhizoids.	Fixation is carried out by roots.
4	Sporophyte is parasitic over the gametophytic plant body throughout its life.	The gametophyte is small and independent.
5	Bryophytes are nonvascular in nature.	Pteridophytes are vascular plants.

The thallophytes, bryophytes and pteridophytes have naked embryos that are called spores.
All of these have inconicuous reproductive organs are called cryptogams or those with hidden sex organ.

Embryophytes – Plants having an embryo stage in their life cycle – bryophytes, pteridophytes, seed plants.

Sporophyte lives as a parasite over it.

Tracheophyta – Plant group having vascular tissues – pteridophyta and spermatophyta.

Practice Zone - 1.3

1. Define thallus.
2. Mention two important characteristics of thallophyta.
3. What is the chemical characteristics of algal cell wall ?



4. To which division of cryptogams do algae belong ?
5. Name the division which is known as "amphibians of plant kingdom".
6. Name the plant structure, which helps in attaching the bryophytes to the substratum.
7. What is peculiar about sex organs in bryophytes ?
8. Give two examples of bryophytes.
9. Give two examples of pteridophytes.
10. Name the group of vascular cryptogams.

Spermatophyta (Gk. sperma – seed, phyton – plant)

Characteristics Main plant body is a sporophyte which is differentiated into stem, leaves and roots. Vascular tissues are well-developed throughout the plant body.

Sporangia occur over modified leaves called sporophylls. Sporophylls are aggregated to form cones or flowers.

Male and female gametophytes are distinct. They are small and dependent on the sporophyte for their nutrition.

Male gametophytes or pollen grains reach near the female sex organs through an external agency of wind, water or animals. This process is called pollination. Fertilization occurs with the help of a pollen tube. An external water is not required.

After fertilization plants produce seeds which contains embryo along with stored food. On germination each seed forms a new plant.

Spermatophyta or phanerogams are classified into two groups (Gymnosperm, Angiosperm) on the basis of naked or enclosed seeds.

Differences Between Pteridophytes and Phanerogams (Spermatophytes)		
	Pteridophytes	Phanerogams / Spermatophytes
1	They are seedless plants.	Phanerogams are seed bearing plants.
2	Gametophytes are small but independent.	Gametophytes are nutritionally dependent upon the sporophyte.
3	Reproductive organs are inconspicuous.	Reproductive organs are quite conspicuous.
4	An external water is required for fertilization.	Fertilization does not require an external water.

4. **Gymnosperm** : Gymno- naked and sperm - seeds.

Plants are evergreen, woody and perennial. They are trees and shrubs.

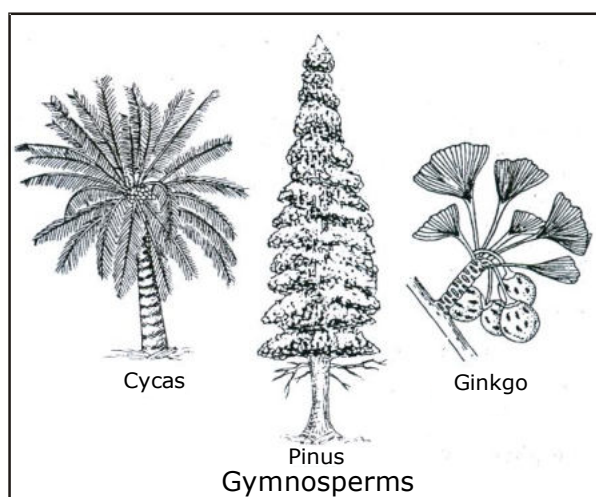
Sporophylls are aggregated to form cones. There are separate male and female cones. They bear naked seed. The seeds are not enclosed inside fruits. Instead they lie exposed over the megasporophylls.

Xylem lack vessels and phloem lack companion cells in Gymnosperm.

Examples :

Cycadae - *Cycas*

Coniferae - *Pinus* (Pines), *Cedrus* (deodar), *Ginkgo*.



5. **Angiosperm** - Angio- covered and sperm - seed.

Characteristics : These Plants are deciduous or evergreen, annual biennial or perennial herbs, shrubs or trees.

These are called flowering plant. Sporophylls are aggregated to form flowers. Flowers may be unisexual or bisexual.

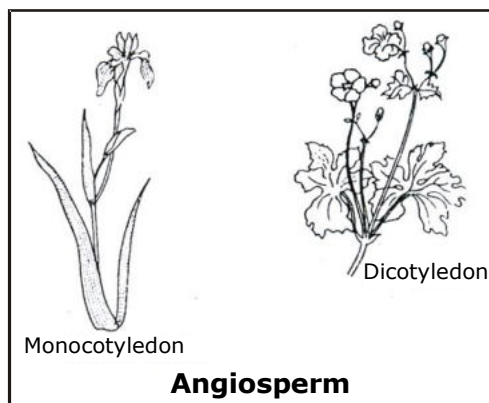
Pollination occurs by wind, water and animals.



The plants of this group produce seeds inside an organ called ovary, which is modified into fruit. Endosperm is a new food storing structure which is generally triploid and is formed by fusion of three nuclei (triple fusion).

Embryo is present in the seed and bears leafy or fleshy structures called cotyledons (seed leaves)

Cotyledons represent a bit of pre-designed plant in the seed.



Differences Between Gymnosperms and Angiosperms		
	Gymnosperms	Angiosperms
1	They are aggregated to form cones.	Sporophylls are aggregated to form flowers.
2	The seeds are naked.	The seeds are enclosed by fruit wall.
3	The microspores and megaspores are produced by male and female cones.	They are produced in the same or two different types of flowers.
4	Xylem lacks vessels and phloem lacks companion cells.	Xylem contains vessels and phloem contains companion cells.
5	The ovules are not contained in the ovary.	The ovules are enclosed in the ovary.
6	Endosperm is haploid.	It is triploid.

In angiosperms, a seed may have one or two cotyledons. On the basis of cotyledon number, angiosperms have been divided into two classes, dicotyledoneae and monocotyledoneae.

CLASS DICOTYLEDONEAE

It is a class of angiosperms in which seeds possess two cotyledons. The plants of this class are commonly called dicots or dicotyledonous plants. Some other characters are reticulate venation, tap root system, pentamerous or tetramerous flowers. eg. Gram, Pea, Mustard, Ipomoea.

CLASS MONOCOTYLEDONEAE

The members of class monocotyledoneae of angiosperms are characterised by the occurrence of a single cotyledon in their seeds. They are commonly called monocots or monocotyledonous plants. Other characters of monocots are parallel venation, fibrous root system, trimerous flowers. eg. Lily, Coconut, Wheat, Maize, Grass, Bamboo, *Paphiopedilum*.

Differences Between Dicotyledoneae and Monocotyledoneae		
	Dicotyledoneae	Monocotyledoneae
1	In the seeds, the embryo bears two cotyledons.	In the seeds, the embryo bears one cotyledon.
2	The leaves show reticulate venation.	The leaves show parallel venation.
3	Vascular bundles of the stem are open and arranged in a ring.	Vascular bundles of the stem are closed and scattered in the ground tissue.
4	The plants have tap root system.	The plants have adventitious root system.
5	Secondary growth occurs.	Secondary growth does not occur.
6	Flowers are pentamerous (have five of each floral part) or tetramerous.	Flowers are trimerous (have three of each floral part).



KINGDOM ANIMALIA

Characteristics :

- (i) **Cellular Nature** : Members of kingdom animalia are wall less, eukaryotic and multicellular.
- (ii) **Nutrition** : It is heterotrophic.
- (iii) **Locomotion** : Most animals are mobile.

"Terminology" used in classification -

Grades of Body Organization -

- (i) **Cellular grade** - e.g. Sponges
- (ii) **Cell-tissue grade** - e.g. Coelenterates
- (iii) **Tissue - Organ grade** - e.g. Flatworms
- (iv) **Organ- System grade** - e.g. Aschelminthes to Chordates.

Body Plans -

- (i) **Cell aggregate** - e.g. Sponges
- (ii) **Blind sac** - e.g. Coelenterates , Flatworms
- (iii) **Tube within a tube** - e.g. Aschelminthes to Chordates

Body symmetry - It is similarity in arrangement of body parts.

- (i) **Radial symmetry**- Body can be divided into similar halves by any plane passing through centre axis.
- (ii) **Bilateral symmetry**- Body can be divided along a median longitudinal plane into two mirrored portions right and left halves.

Germ layers -

- (i) **Diploblastic animals** - having **two** germ layers i.e. **ectoderm** and **endoderm**.
- (ii) **Triploblastic animals** - having **three** germ layers i.e. **ectoderm**, **endoderm** and **mesoderm**.

Metameric segmentation -

Body is divided into segments **externally** as well as **internally** (by septa).

Body Cavity [Coelom] -

A body cavity is a fluid-filled space between the gut and the outer body wall of an animal.

- (i) **Acoelomates** : Animals without coelom e.g. Flatworms
- (ii) **Pseudocoelomates** : In these animals, coelom is not lined by mesoderm. e.g. Nematodes.
- (iii) **True coelomates** : In these animals, coelom is lined by mesoderm.

True coelom may be of two types :

- (i) **Schizocoelom** : Coelom is originated by splitting of mesoderm. **e.g.** Annelids, Arthropods, Molluscs.
- (ii) **Enterocoelom** : Coelom is originated by endodermal pouches. **e.g.** Echinodermates, Hemichordates, Chordates.

Body temperature :-

- (i) **Ectotherm** or **Poikilotherm** or **Cold-blooded** :

Their body temperature changes according to environmental temperature. **e.g.** Pisces, Amphibians, Reptiles.

- (ii) **Endotherm** or **Homeotherm** or **Warm- blooded** :

Their body temperature cannot change according to environmental temperature. **e.g.** Mammals, Aves.



1. PHYLUM PORIFERA - PORE BEARING ANIMALS

[Gk. *porus* - pore ; *ferre* - to bear]

Common name - "the sponges"

General Characters :

1. They live mostly in the sea (marine) but a few occur in fresh water.
2. They have **cellular level** organization with two germ layer i.e. **diploblastic animals**.
3. They are sessile or stationary.
4. Most of sponges are **asymmetrical**, some are **radially symmetrical**.
5. Sponges have pores on body and these pores are called **ostia**. Ostia open into a **canal system** and the canal opens to outside by a large opening ; named **osculum** present at top.
6. Skeleton of sponges is made up of minute **calcareous** or **siliceous spicules** or **spongin fibres**.

e.g. Sycon (Scypha) - Urn sponge

Euplectella - Venus's flower basket

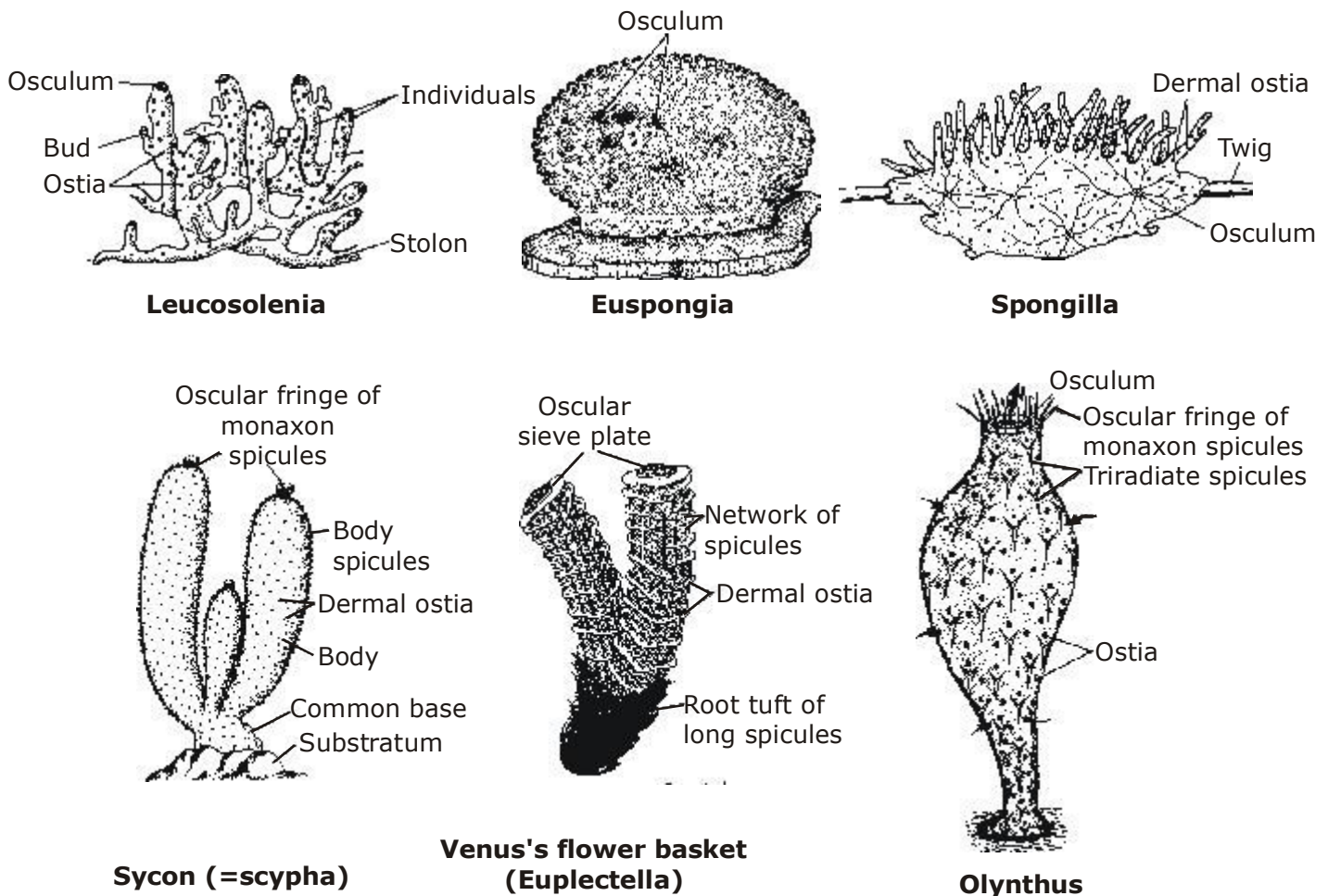
Hyalonema - rope sponge

Cliona - boring sponge

Euspongia - bath sponge

Spongilla

Olynthus



2. PHYLUM CNIDARIA OR COELENTERATA

[Gk. *Knide* = sting cells]

General Characters :

1. Aquatic animals mostly marine, some live in colonies (corals) while other live solitary.
2. Body is **radially symmetrical**.
3. These are the first multicellular animals having **tissue level organization** with distinct labour of division.
4. Body has a central gastrovascular cavity- **coelentron** which lacks anus but has mouth which is surrounded by **tentacles**.
5. The body bears specialized cells-**cnidoblasts**, bearing stinging cell organelles called '**nematocysts**'.
6. Nematocysts serve the function of paralysing the prey by injecting poison.
8. Nervous system is primitive, has only network of nerve cells (nerve net).
9. Coelenterates show two main forms, the **polyp** (asexual) and the **medusae**. (sexual)

e.g. **Hydra** : fresh water coelenterate

Obelia

Physalia -Portugese man of war

Pennatula - sea-pen

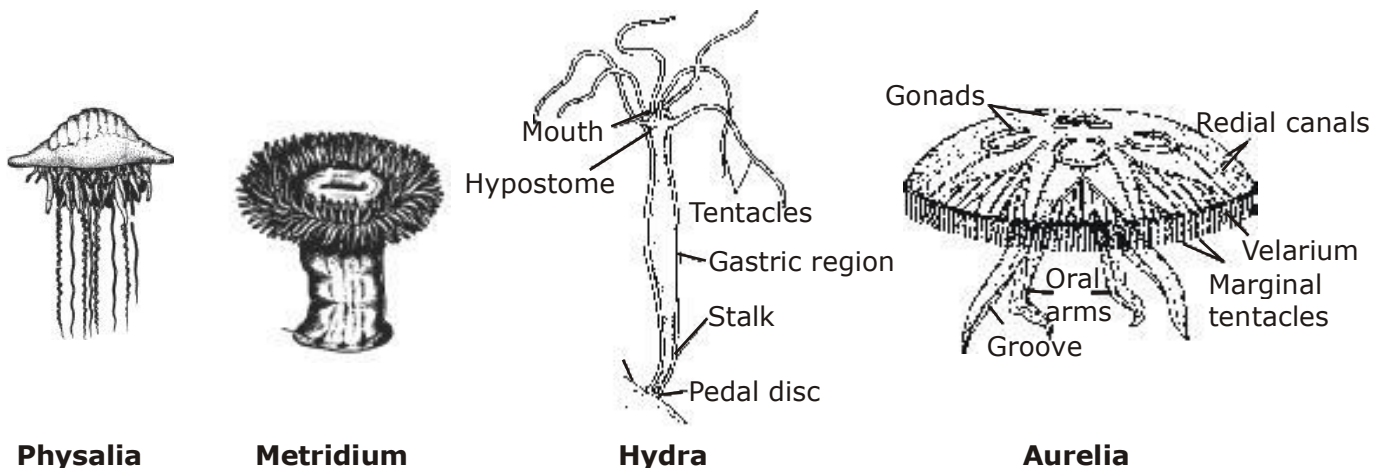
Corallium- red coral

Millepora-coral

Aurelia -jelly-fish

Metridium- sea-anemone

Gorgonia- sea fan



Differences Between Porifera and Coelenterata		
Characteristics	Poriferans	Coelenterates
1. Organisation :	It is cellular level	It is of tissue level.
2. Pores :	A number of inhalent pores (ostia) and a single exhalent pore (osculum) are present.	There is a single opening.
3. Digestion :	It is intracellular.	It is both intracellular and intercellular.
4. Nerve Cells	They are absent.	Nerve cells appear for the first coelenterates.
5. Appendages :	They are absent.	Appendages are represented by tentacles.
6. Special Cells :	The special cells are choanocytes or collar cells.	Special cells are cnidoblasts.



3. PHYLUM PLATYHELMINTHES

[Gk. *platys* = Flat ; *helmin* = worm]

Common name : Flatworms

General Characters :

1. Mostly parasitic animals, some are free-living (e.g. *Planaria*) and aquatic.
2. They are **triploblastic** animals showing **bilateral symmetry** and **tissue organ grade** of body organization.
3. The organisms are unsegmented, dorsoventrally flattened.
4. Body cavity (coelom) is absent i.e. **acoelomate**.
5. Suckers and hooks are usually present.
6. Alimentary canal has only one opening i.e. mouth, anus is absent.
8. Excretory system consists of blind tubules called protonephridia; having **flame cells**.
9. They are **hermaphrodite** i.e. male and female reproductive organs are present in same animal.

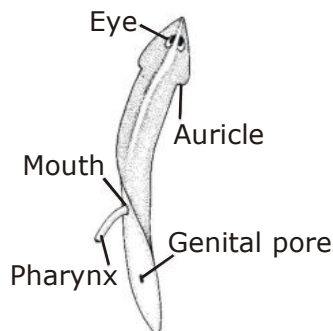
e.g. *Planaria* or *Dugesia*

***Microstomum*-** Energy of Hydra.

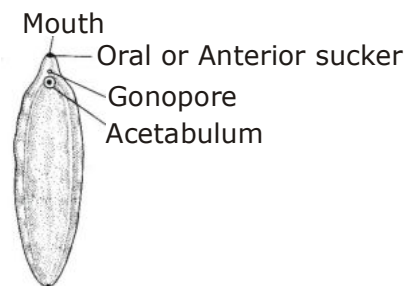
***Fasciola*-** Liver fluke

***Schistosoma* -** Blood fluke

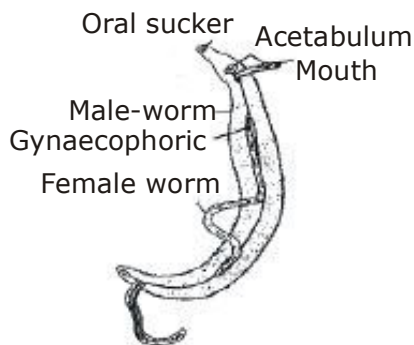
***Taenia solium* -** Pork tape worm.



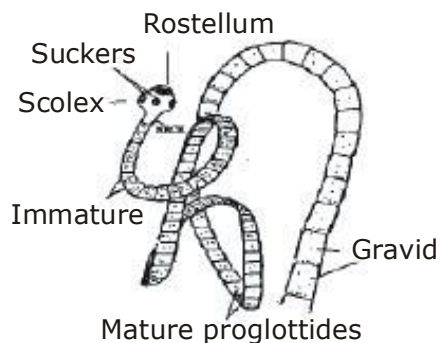
Planaria



Fasciola



Schistosoma



Taenia

4. PHYLUM NEMATODA OR ASCHELMINTHES

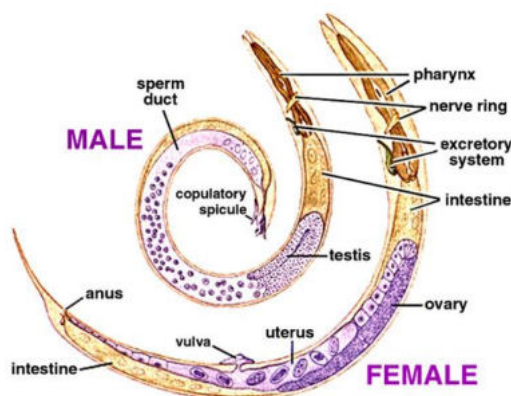
[Gk. *nema* = thread ; *helmin* = worm]

Common name - Thread worm or Round worm

1. They are parasitic, most are free living (in fresh or marine water or terrestrial).
2. They have narrow, elongated and cylindrical bodies. Body is covered by cuticle.
3. **Triploblastic unsegmented animals** with **bilateral symmetry** and **organ system** level of organization, having **tube within tube body plan**.
4. **Pseudocoelom** is present.
5. Alimentary canal straight and complete with mouth and anus.
6. Unisexual organisms.

e.g. *Ascaris* - round worm ; *Enterobius* - pin worm ; *Wuchereria* - filarial worm ; *Ancylostoma* - Hook worm.

Differences Between Platyhelminthes and Aschelminthes		
Characteristics	Platyhelminthes	Aschelminthes
1. Form :	They are flatworms.	They are cylindrical in form and are called roundworms.
2. Coelom :	Platyhelminthes are acoelomate	They are pseudocoelomate.
3. Digestive Tract :	It is incomplete.	It is complete.
4. Sexuality	Animals are hermaphrodite.	Animals are unisexual.



Ascaris(Round Worm)

5. PHYLUM- ANNELIDA

[Gk. *annulus* = ring ; *lidos* = form]

Common Name : Segmented worms

General Characters :

1. They occur in fresh water, sea water or moist soil. Some are free living, some are burrowing and a few are parasites.
2. Body is **metamerically segmented i.e.** body is divided externally by transverse grooves as well as internally by septa, these segments are called **metameres**.
3. They are the first animals with true body cavity i.e. **coelom**.



4. They are **bilaterally symmetrical, triploblastic** animals.
5. Body is covered by thin cuticle.
6. Locomotion by **parapodia** or **Chitinous setae** which are segmentally arranged.
7. Alimentary canal is complete.
8. Respiration is through the general body surface.
9. Excretion by **nephridia**.
10. Blood vascular system is **closed**. Blood is red due to the presence of the pigment "**haemoglobin**".
11. The nervous system consists of a **dorsal "brain"** and a **ventral nerve cord** having ganglia and lateral nerves in each body segment.
12. Sexes may be united (hermaphrodite) or separate.

e.g. **Nereis** - sand worm (clam worm)

Pheretima - Earthworm

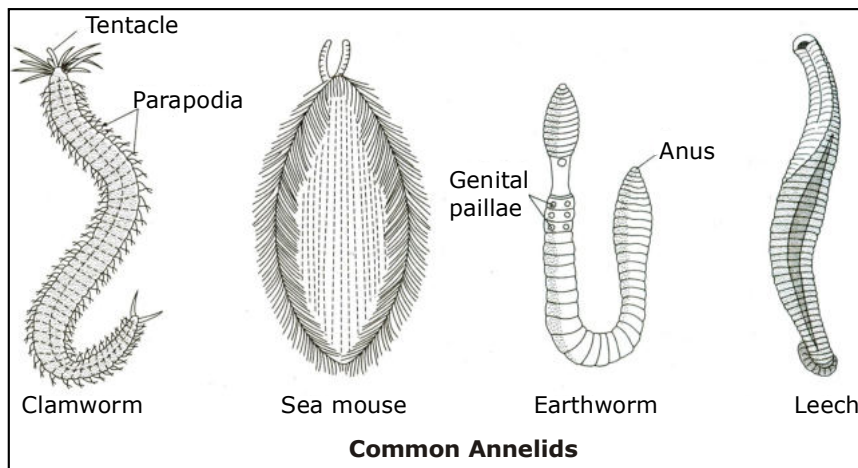
Hirudinaria - Indian cattle leech

Hirudo - medicinal leech.

Aphrodite - sea mouse

Megascolex - Largest earthworm

Bonellia



6. PHYLUM ARTHROPODA

[Gk. *Arthron* = joint ; *Podas* = foot]

Common Name : The animals with jointed feet.

The largest group of animals

General Characters :

1. They are found everywhere on earth- on land, in soil, in water and as parasites on plants and other animals.
2. Triploblastic, bilaterally symmetrical and metamerically segmented animals.
3. The body is segmented into **2** regions- **head** and **thorax together** and **abdomen** or **3** regions- **head**, **thorax** and **abdomen**. Anterior part of body forms a distinct head, bearing sense organs . Animals have jointed legs (3 or more pairs).
3. Arthropods have **compound eyes**, having many lenses to make **mosaic vision**.
4. Exoskeleton is made of **chitin**.
5. The body cavity is filled with blood i.e. **haemocoel**. **Open** circulatory system is present. Blood may be colourless - **Haemolymph** (e.g. insects) or with copper contain pigment - **Haemocyanin** (e.g. prawn)
6. Mouth parts adapted for biting, chewing, piercing and sucking.
7. Respiration occurs through general body surface, gills tracheae or book lungs.
8. Excretion occurs by '**Malpighian tubules**' or **green glands** or **coxal glands**.



9. Sexes are separate.

e.g. **Peripatus**

Cyclops - one eyed giant

Scolopendra- Centipede

Lepisma - Silver fish

Schistocerca - Locust

Periplaneta - Cockroach

Apis - honey bee

Culex - mosquito

Pieries - Butterfly

Limulus - king crab

Arnea - spider

Palaemon - (Prawn)

Cancer - crab.

Julus - Millepede

Melanopus - grasshopper

Gryllus - house cricket

Musca - House fly

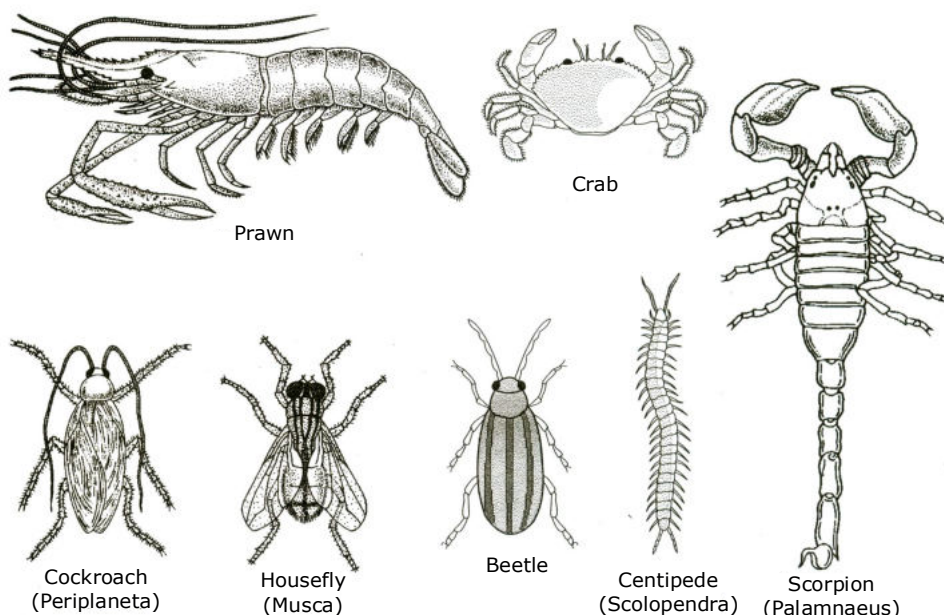
Anopheles - mosquito

Cimex - bed bug

Bombyx - silkmoth

Palamnaeus- scorpion

Argus- ticks



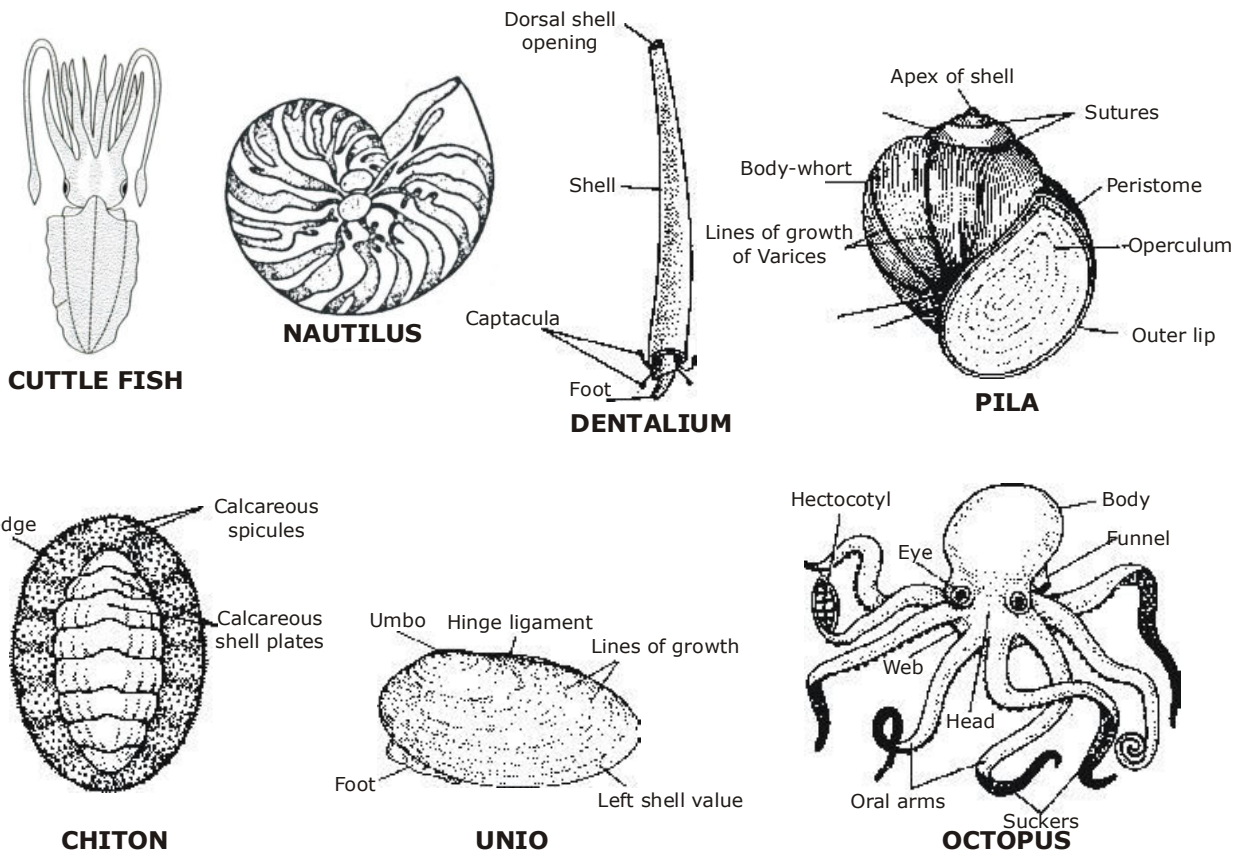
Some Arthropods

Differences Between Annelids and Arthropods		
Characteristics	Annelids	Arthropods
1. Appendages :	They are unjointed.	Appendages are jointed
2. Circulation :	Blood flows inside blood vessels (closed circulatory system).	Blood flows through large sinuses or spaces (open circulatory system)
3. Coelom :	True coelom is well-developed.	True coelom is small. Instead, blood filled with body cavity called haemocoel is present.
4. Chitinous Exoskeleton :	A chitinous exoskeleton is absent	A chitinous exoskeleton is present.
5. Excretory organs :	They are nephridia.	Excretory organs are green glands and Malpighian tubules.
6. Sensory System :	It is less developed.	Sensory system is well-developed
7. Locomotory Organs :	They are parapodia and setae.	They are legs and wings.

7. PHYLUM- MOLLUSCA

[L. Molluscs = soft]

Common Name : The Soft Bodied Animals



The second largest group of animals.

General Characters :

1. They are mostly aquatic, living in sea water, some of fresh water.
2. They are **soft, unsegmented, triploblastic, coelomate** animals with **bilateral symmetry**.
3. The body is divided into an anterior **head**, a ventral **muscular foot** and a dorsal **visceral mass of hump**. Over the hump, a fold of thin skin called **mantle** or **pallium** is present, which secretes the shell.
4. The soft body is usually supported by a hard shell of **calcium carbonate**.
5. Locomotion is brought about by **muscular foot**.
6. Buccal cavity contain a rasping organ the '**radula**' for feeding.
7. Respiration occurs through gills called **ctendia**.
8. **Open** blood vascular system. Blood is usually blue due to a blue pigment called "**haemocyanin**".
9. Excretion by a pair of kidneys or metanephridia, known as **Kaber's organ** or **Organ of Bojanus**.

e.g. Neopilina - Living fossils

Aplysia - sea hare

Unio - fresh water mussel

Octopus- devil fish

Chiton- Coat of mail shell

Helix - garden snail

Pinctada - Indian pearl oyster

Loliga - sea squid

Pila - apple snail

Dentalium - tusk shell

Sepia - cuttle fish

Nautilus



8. PHYLUM - ECHINODERMATA

[Gk. *echinos* = spines ; *derma* = skin/covering]

Common Name : The Spiny Skinned Animals.

General Characters :

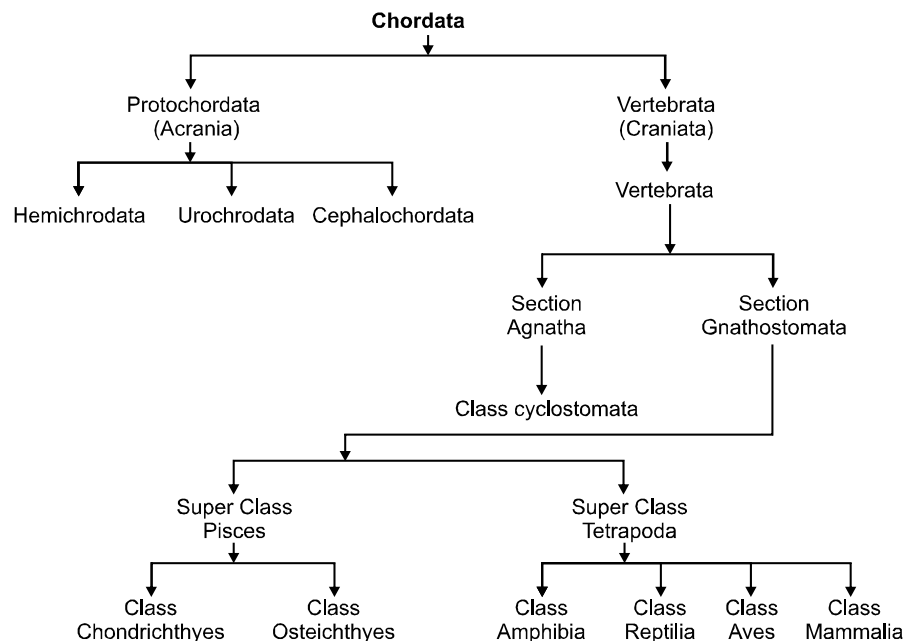
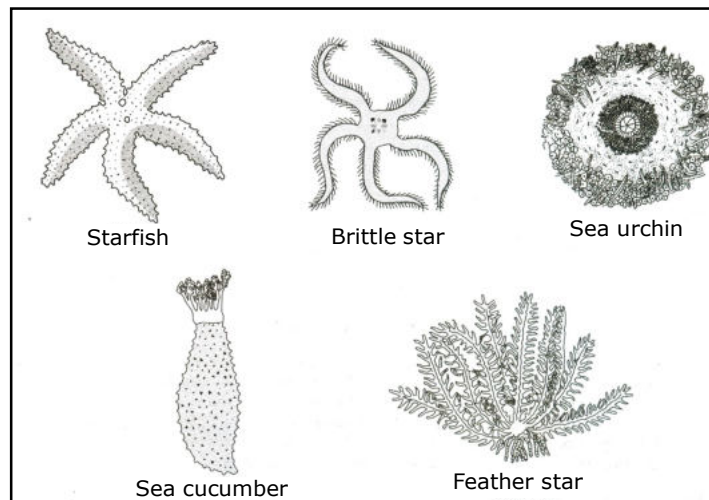
1. They are **exclusively marine** animals.
2. Body is **triploblastic, coelomate** and without segmentation with **radial symmetry in adult** and **bilateral** in **larvae**.
3. Body lacks head, but has oral and aboral surfaces. Oral surface of body has five radial areas called **ambulacra**.
4. Body cavity is modified into **water vascular system**. Tube like extensions called **tube feet**. Tube feet help in locomotion and food collection.
5. Digestive system is complete , mouth is on the lower surface and the anus is on the upper surface.
6. Respiration by gills, genital bursae, or respiratory trees.
7. Reproduction sexual, asexual or by regeneration. Sexes are separate.

e.g. *Pentaceros* - sea pentagon ***Asterias*** - star fish or sea star

Ophioderma - brittle star ***Ophiura***

Echinus - sea urchin ***Holothuria*** - sea cucumber

Antedon - sea lily or sea feathers



CHORDATA

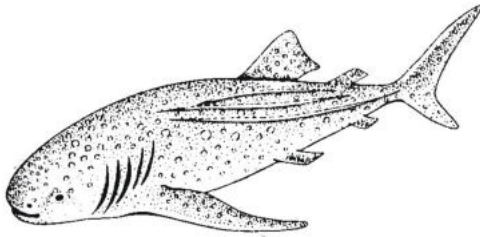
(Gk. *chorde*-string)

Chordata is a phylum of triploblastic bilaterally symmetrical coelomate animals.

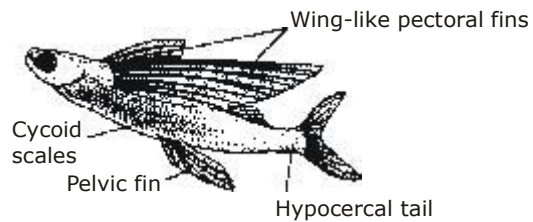
Diagnostic Characteristics :

- (i) **Notochord (Gk. *noton*-back, *chorde*-cord)** : It is a long rod-like structure that develops between dorsal nervous system and gut. Notochord functions as a support structure that provides points for attachment to muscles.
- (ii) **Dorsal Hollow Nerve Cord** : It occurs above the notochord.
- (iii) **Pharyngeal Gill Slits (Gill Pouches)** : They are paired respiratory structures which remain functional throughout life in fishes and some amphibians. In others they occur only in embryo.
- (iv) **Post anal Tail**. It occurs in most chordates for balancing, protection of genital and anal regions.

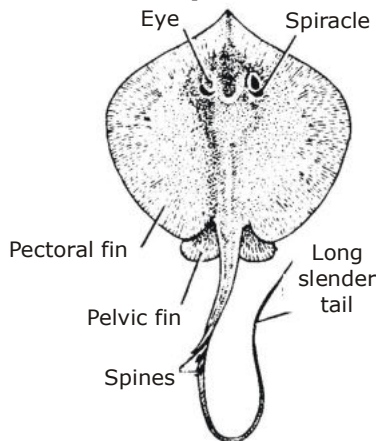
Protochordata [Lower chordates]



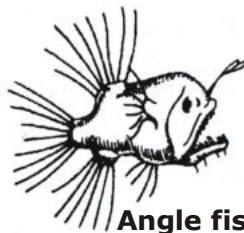
Whale shark (*Rhineodon typicus*)



Exocoetus



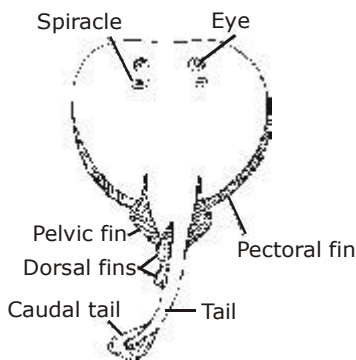
**Sting ray
Trygon**



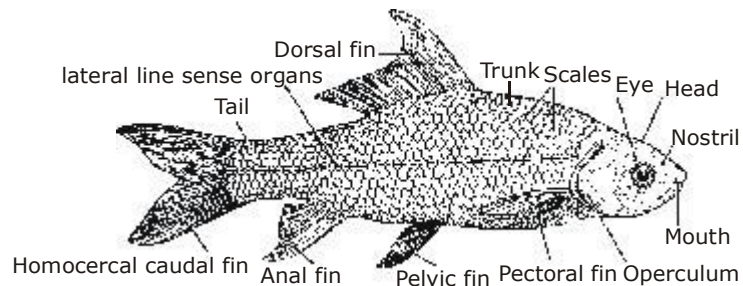
Angle fish



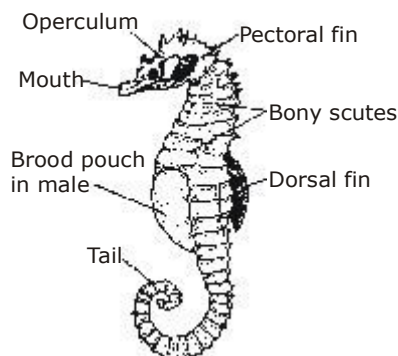
Mandarin fish



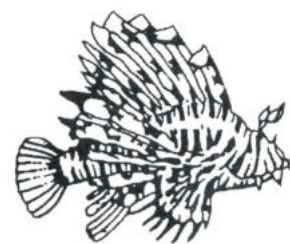
Electric ray (*Torpedo*)



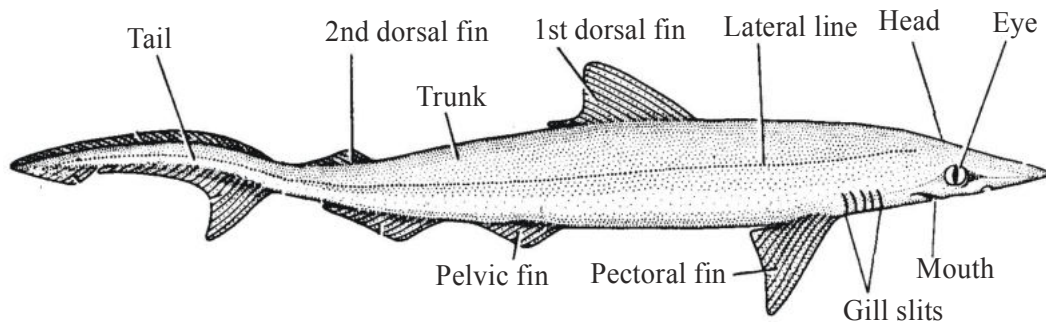
Labeo rohita: External features in side view



Hippocampus



Lion fish



Scoliodon

General Characters :

1. Exclusively all are marine.
2. These are **bilaterally symmetrical**, **triploblastic** and **coelomic** animals.
3. They have a rod-like structure i.e. **notochord** at some stages during their lives.
4. **Pharyngeal gill clefts** are found throughout the life span.
5. They have a dorsal tubular **nerve cord**.
6. Protochordates may be grouped into following subphyla-
(i) Hemichordata (ii) Urochordata (iii) Cephalochordata

Subphylum- Hemichordata

General Characters :

1. These animals possess a combination of nonchordate and chordate characters.
2. They are soft, unsegmented, worm like and bilateral symmetrical animals..
3. They have notochord as buccal diverticulum or stomochord in proboscis.
4. Body is divided into proboscis, collar and trunk.

e.g. **Balanoglossus** - Acorn worm.

Subphylum- Urochordata

General Characters :

1. Notochord is present only in the tail of free living tadpole like larva
2. Adult members have test all over their body, made up of tunicin (just like cellulose).

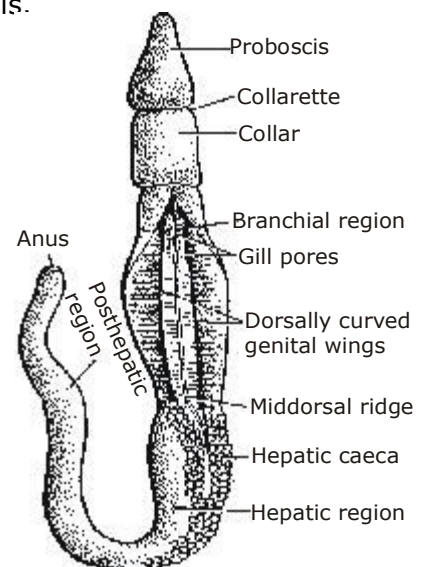
e.g. **Herdmania** – Sea potato or sea squirts.

Subphylum – Cephalochordata

General Characters

1. First complete chordate animals.
2. Notochord, Nerve cord and pharyngeal gill clefts remain throughout the life span.

e.g. **Branchiostoma** or **Amphioxus** (Lancelet – Typical chordate)



Balanoglossus

VERTEBRATA

General Characters :

1. Vertebrates are bilaterally symmetrical, triploblastic, coelomic and segmented animals.
2. In vertebrates notochord is replaced by vertebral column.
3. Nerve cord remains enclosed within vertebral column.

Vertebrata are grouped into five classes

(i) Pisces (ii) Amphibia (iii) Reptilia (iv) Aves (v) Mammalia



(1) CLASS - PISCES

1. This class includes **true fishes**.
2. They are exclusively water living animals.
3. Their body is **streamlined** and covered by **scales**.
4. They have **paired fins** for locomotion.
5. They respire through **gills**.
6. Heart is **two chambered**.
7. Their endoskeleton is made up of **cartilage** or **bones**.
8. They are unisexual and lay eggs.
9. They are **cold blooded**.

Fishes are of two types based on the nature of their endoskeleton.

1. Cartilaginous fishes

2. Bony fishes

Characters

Endoskeleton
Body scales
Operculum
Mouth position
Excretory material
Fertilization
Habitat

Cartilaginous fishes

Cartilage
Placoid
Absent
Ventral
Urea
Internal
Marine water

Bony fishes

Bones
Cycloid or Ctenoid
Present
Terminal (anterior)
Ammonia
External
Marine and Fresh water

Cartilaginous fishes

- e.g. **Scoliodon** – Dog fish
Sphyrna – Hammer head shark
Trygon – Sting ray
Chimera – Rat fish or Ghost fish or King of Herrings
Pristis – Saw fish
Torpedo – Electric ray
Rhineodon – Whale shark.

Bony fishes

- e.g. **Labeo rohita** – Rohu or Indian carp
Anabas – Climbing perch
Hippocampus – Sea horse
Exocoetus – Flying fish
Synchiropus splendidus – Mandarin fish
Caulophryne jordani – Angler fish
Pterois volitans – Lion fish

(2) CLASS - AMPHIBIA

[Gk. *Amphi* = two ; *bios* = life]

General Characters :

1. These are the first vertebrate which come out of water but these are not able to live on land permanently. These depend on water for their reproduction.
2. Their skin is **smooth** or **rough, moist, slimy, glandular** and **without scales**. To moist the skin numerous glands are found and skin having pigment cells (chromatophores) for colouration.
3. Notochord does not persist in adults.
4. Head and trunk distinct, tail may be present.
5. Two pairs of pentadactyl (five digits) limbs are present. Digits without claws.
6. Three chambered heart has two auricles and one ventricle.
7. Respiration by gills, lungs, skin and buccal lining.
8. Excrete either ammonia (by tadpole) or urea (by adults)
9. They are cold-blooded animals.
10. Animals are unisexual; fertilization external, mostly lay eggs.



e. g. **Ichthyophis** – Blindworm

Salamander (Salamandra)

Siren – Mudeel

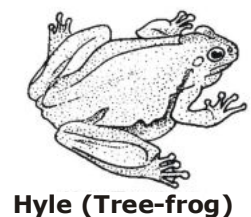
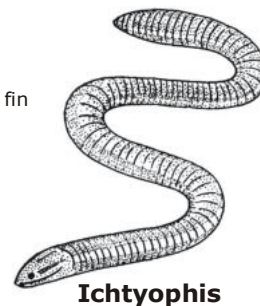
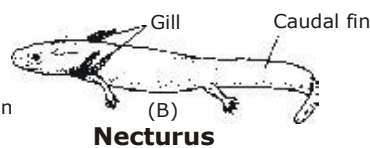
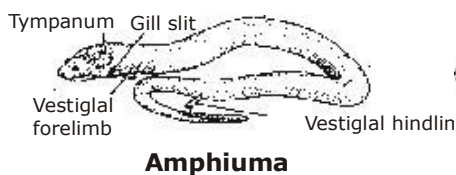
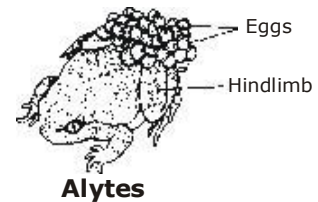
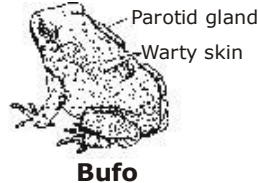
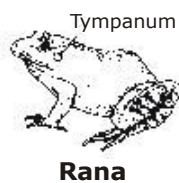
Hyla – Tree-frog

Alytes – Midwife toad

Necturus – Mud puppy

Bufo – Common toad

Rana tigrina – Indian bull frog



(3) CLASS - REPTILIA

[L. *reptare* = to creep]

General Characters :

1. First successful terrestrial animals but some are aquatic.
2. Body is divided into head, neck, trunk and tail.
3. Skin is dry, cornified, rough and nonglandular. Water proof protein, keratin.
4. Two pairs of pentadactyl limbs with incurved nails or claws
5. Exoskeleton is made up of horny epidermal scales or dermal scute or bony plates.
6. Heart is three chambered i. e. two auricles and an incompletely divided ventricle. Only crocodiles have four chambered heart.
7. One pair of metanephric kidneys, animals are uricotelic
8. Fertilization is internal.
9. These are mostly oviparous, eggs are cleidoic i.e. eggs are covered by a shell made up of calcium carbonate.
10. These are cold blooded animals.

Testudo – Land tortoise

Chelone – marine turtles
lizard

Calotes – Garden lizard (Girgit)

Python – Azgar, largest snake

Eryx – Sand boa – Dumuhi snake

Naja – Indian Cobra

Crotalus – Rattle snake

Vipera – Viper snake

Gavialis – Gharial

Trionyx – Fresh water terrapins

Hemidactylus – Common lizard, wall

Varanus – Goh, monitor lizard.

Ptyas – Zamenis or Rat snake or Dhaman

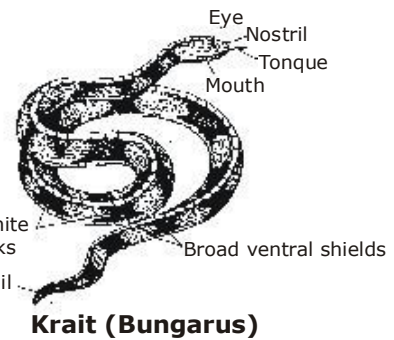
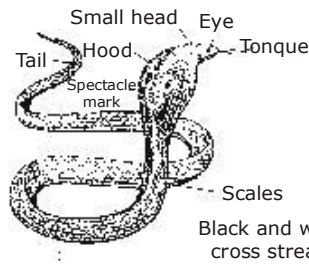
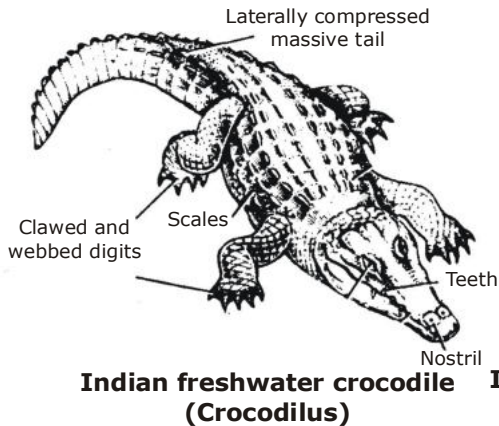
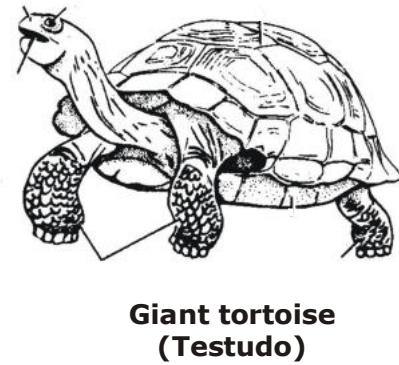
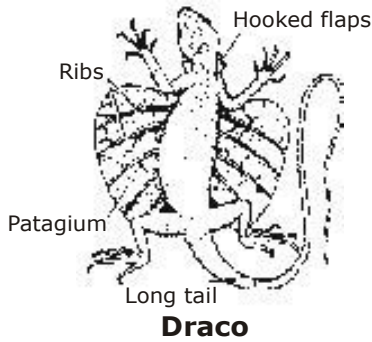
Typhlops – Blind snake

Naja bungarus – King cobra

Bangarus – Krait snake

Crocodilus – Crocodile (Muggar)





Differences Between Amphibia and Reptilia		
Characteristics	Amphibia	Reptilia
1. Skin. :	It is glandular smooth and moist.	Skin is nonglandular, dry and keratinised.
2. Scales :	They are absent	Scales are present over the body.
3. Claws :	Digits do not possess claws.	Digits end in claws.
4. Heart :	It is three chambered.	Heart is incompletely four chambered.
5. Fertilization :	It is external.	Fertilization is internal.
6. Membranes :	Extra embryonic membranes are absent	Extra embryonic membranes are present.
7. Eggs :	They have a soft covering	They have a hard covering or shell.
8. Examples :	Frog, Toad.	Lizards, Snakes, Tortoise.

(4) CLASS - AVES [*L. avis* = bird]

General Characters :

1. All types of birds are included in this class.
2. Body is boat shaped and covered by soft feathers, called "**plumage**".
3. Fore limbs modified into wings for flight.
4. Hind-limbs bear four clawed digits and are adapted for walking and perching.
5. Teeth are absent, jaws form a horny beak.
6. Endoskeleton is made up of hollow, air-filled bones, known as **pneumatic bone**.
7. Four chambered heart with two auricles and two ventricles is present.
8. They excrete uric acid.
9. Sound producing organ at the junction of trachea and bronchi of birds is called **syrinx**.
10. Parental care is present.
11. Fertilization internal. They are oviparous and lay large, eggs having hard shell.
12. They are **warm-blooded** animals.



Penguins, Emu, Ostrich and Kiwi are flightless birds.

Archaeopteryx – Connecting link between reptiles and birds.

Gallus – Chicken

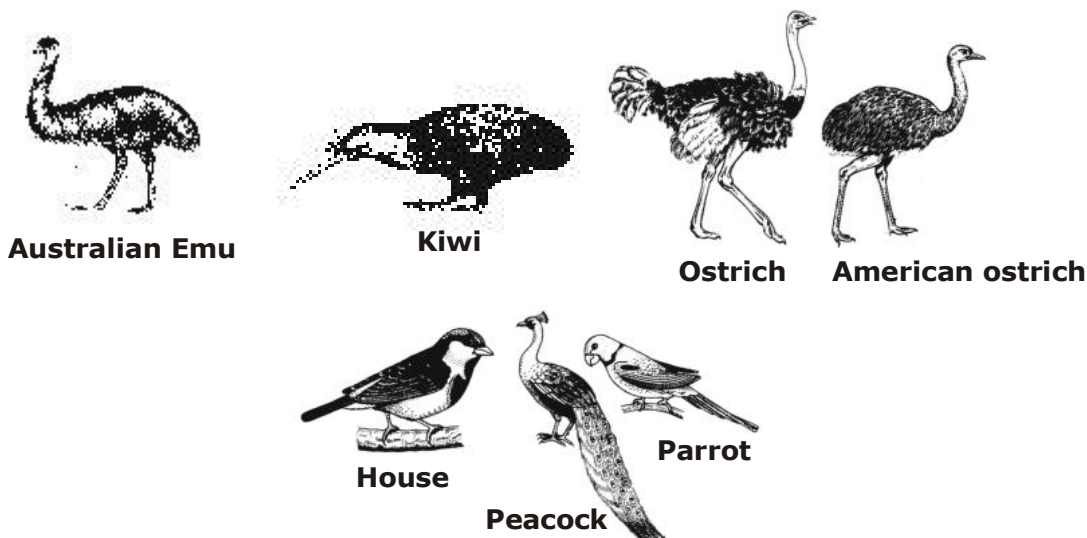
Columba – Pigeon

Passer – House sparrow

Psittacula – Parrot

Corvus – Crow

Pavo – Peacock



(5) CLASS - MAMMALIA

[L. *mamma* = Breast]

General Characters :

1. Members are cosmopolitan.
2. Body is divided into head, neck, trunk and tail with movable eyelids
3. Mammary glands are found in females for baby feeding.
4. The body is covered by a coat of hairs (made of keratin). Cutaneous glands such as sweat glands and oil glands.
5. They have two pairs of pentadactyl limbs.
6. Fleshy external ear (pinnae) present.
7. Respiration is by one pair of lungs.
8. A horizontal diaphragm present in between thorax and abdomen.
9. Heart is four chambered. Non-nucleated red blood corpuscles are present in blood.
10. They excrete urea i.e. ureotelic.
11. Mammals are warm-blooded animals.
12. Sexes are separate, internal fertilization present, mostly viviparous but a few are oviparous and lay eggs (**e.g.** Platypus & Echidna), and some like Kangaroos give birth to very poorly developed young ones.

e.g. Ornithorhynchus – Duck billed platypus

Macropus – Kangaroo

Funambulus – Squirrel

Balaenoptera – Blue whale

Felis – Cat

Panthera tigris – Tiger

Organguttan – Man of forest

Tachyglossus – Echidna or spiny anteater

Pteropus – Flying fox or Bat

Ratus ratus – Rat

Canis – Dog

Panthera leo persica – Lion

Gorilla – Largest ape

Homo sapiens – Man



Differences Between Aves and Mammalia		
Characteristics	Aves	Mammalia
1. Wings :	Forelimbs are modified into wings	Wings are absent except in bats.
2. Feathers and Scales :	The body is covered with feathers and scales.	Feathers and scales are absent.
3. Skin Glands :	Skin is dry. Only a single preen gland	Skin bears a number of sweat and oil glands.
4. Mammary Gland :	They are absent	Female possesses mammary glands for feeding the young ones.
5. Diaphragm :	Diaphragm is absent	A partition called diaphragm is present between abdomen and thorax.
6. Beak :	A toothless beak is present	Jaws do not form a beak. Teeth are present.
7. Bones :	They are hollow or pneumatic.	Bones do not possess air cavities.
8. Larynx/Syrinx :	Larynx is non-functional. Instead syrinx is present	Larynx is functional. Syrinx is absent.
9. Air Sacs :	Lungs possess external air sacs.	External air sacs do not occur over lungs.
10. Yolk :	Eggs possess a lot of yolk (macrolecithal).	Eggs have little yolk (alecithal).
11. Reproduction :	Birds are oviparous.	Mammals are viviparous with the exception of a few species.

- » Hemichordata – Connecting link between non-chordata and chordata.
- » *Archaeopteryx* – Connecting link between reptiles and aves.
- » *Ornithorhynchus* & *Tachyglossus* - Connecting link between reptiles and mammals.
- » *Neopilina* – Connecting link between annelida and mollusca.
- » *Peripatus* – Connecting link between Annelida and Arthropoda.
- » Phlebotomy – To suck impure blood by leech. Leech have an anticlotting agent 'hirudin'.
- » Mammology – Study of mammals.
- » Ornithology – Study of birds. Dr. Salim Ali – Birdman of India.
- » Pterylosis – Arrangement of wings on the body of birds.
- » Nidology – Study of birds nests.
- » Ophiology or Serpantology – Study of snakes.
- » Herpetology – The branch of biology which deals with the study of reptiles.
- » Ichthyology - Study of true fishes.
- » Oology - Study of eggs of birds.
- » The largest bird is ostrich.
- » The fastest flying bird is swift, with flying speed is 171 kilometres per hour.
- » Saurology - The branch of biology which deals with the study of lizards.
- » Malacology - Study of molluscs.
- » Conchology - Study of shells of molluscs.
- » Mammals : Largest - Blue whale, Longest - Giraffe, Smallest - Shrew, Longest Lived - Human being.
- » T.H. Huxley said "bird are glorified reptiles".



NCERT QUESTIONS WITH SOLUTIONS

Q.1 Why do we classify organisms?

Ans. There are a large number of living organisms in this biosphere having great diversity in shape, size and forms. Practically, it is not possible to examine and study every organism separately at individual level. So, animals should be classified to make their study easy.

Q.2 Give three examples of the range of variations that you see in life forms around you?

Ans. (a) The living organism vary in size from microbes of few micro metres to more than 100 metres tall trees.

(b) The living organisms range from colourless and transparent to brightly coloured birds and flowers.

(c) The lifespan of organisms vary from few days (few insects) to several thousand years (trees).

Q.3 Which do you think is a more basic characteristic for classifying organisms?

(a) The place where they live

(b) the kind of cells they are made of, why?

Ans. A more basic characteristic for classifying organisms is the kind of cells they are made of. The organisms are classified according to cell type (prokaryotic or eukaryotic) and cell wall characteristic.

Q.4 What is the primary characteristic on which the first division of organism is made?

Ans. The primary characteristics used for making the broader division of organisms is 'cell type', i.e., whether the organisms are prokaryotic or eukaryotic.

Q.5 On what basis are plants and animals put into different categories?

Ans. Plants and animals differ from each other on the basis of their mode of nutrition as well as their body design. Plants are autotrophic and perform photosynthesis whereas animals are heterotrophic and get food from other organisms. Plant cell have cell wall whereas animal cell lacks cell wall. Animals stop growing after reaching certain size but plants continue growing till death.

Q.6 Which organisms are called primitive and how are they different from so-called advanced organisms?

Ans. The organisms that existed on the primitive earth are, referred as 'primitive' and the organisms that came into existence later as a result of evolution are called as 'advanced organisms'. Advanced organisms have well-developed features and are more complex in comparison to the primitive. For example, unicellular prokaryotic bacteria are primitive and multicellular eukaryotic higher plants and animals are advanced.

Q.7 Will advanced organisms be the same as complex organisms? Why?

Ans. Yes, comparatively complex organisms are more advanced than the simple organisms. It is because the complexity of organisms has increased over the evolutionary period.

Q.8 What is the criterion for classification of organisms belonging to kingdom monera or protista?

Ans. The organism which are unicellular and eukaryotic are grouped under the kingdom protista. The organisms which do not possess well-defined nucleus, cell organelles and have unicellular or multicellular body designs are grouped under the kingdom monera.

Q.9 In which kingdom will you place an organism which is single-celled, eukaryotic and photosynthetic?

Ans. Kingdom protista



Q.10 In the hierarchy of classification, which grouping will have the smallest number of organisms with a maximum of characteristics in common and which will have the largest number of organisms?

Ans. Species possess smallest number of organisms with a maximum number of common characteristics. Kingdoms possess largest number of organisms.

Q.11 Which division among plants has the simplest organisms?

Ans. Thallophyta among the plants has the simplest organisms.

Q.12 How are pteridophytes different from phanerogams?

Ans. Pteridophytes do not produce seeds whereas plants belonging to phanerogams produce seeds.

Q.13 How do angiosperms and gymnosperms differ from each other?

Ans. Angiosperms bear seeds inside the fruit whereas gymnosperms bear naked seeds (i.e., seeds are not enclosed within the fruits).

Q.14 How do poriferan animals differ from coelenterate animals?

Ans. Poriferans possess cellular level of organisation whereas organisation.

S.No.	Parameter	Porifera	Coelenterata (Cnidaria)
1	Organisation	Cellular level of organisation is found.	Tissue level of organisation is found.
2	Pores	Numerous pores called ostia and a single large opening called osculum is present.	A single large opening is present.
3	Special cells	Choanocytes or collar cells	Cnidoblasts or nematocysts
4	Digestion	Digestion is intracellular.	Digestion is both intercellular and intracellular
5	Appendages	Absent	Present in the form of tentacles
6	Nerve cell and Muscles	Absent	Present

Q.15 What are the advantages of classifying organisms?

Ans. The following are the advantages of classifying organisms.

- Classification of organisms make their study easy.
- It is not possible for us to know about all organisms individually, thus the study of few representatives from each group gives a broad idea of life as a whole.
- Classification helps to give information about the organism which occurs at specific places.
- It reveals evolutionary trends by showing gradually increasing complexity of structure in various groups of organisms.



Q.16 How would you choose between two characteristics to be used for developing a hierarchy in classification/

Ans. Before developing hierarchy in classification, we should be aware about characteristics which should be used as the basis for making the divisions. Then we should pick up next set of characteristics for making sub-groups. This process must be continued and each time new characteristic should be used. The characteristics in the next level should be independent to the previous one that will decide subsequent division of groups.

Q.17 Explain the basis for grouping organisms into five kingdoms.

Ans. The organisms were grouped into five kingdoms on the basis of the following characteristics-

- (i) Phylogenetic relationship between the organisms
- (ii) Cell structure (unicellular or multicellular)
- (iii) Complexity of body structure
- (iv) Mode of nutrition

Q.18 What are the major divisions in plantae? What is the basis for these divisions?

Ans. The major division of kingdom plantae are : (i) thallophyta (ii) bryophyta (iii) pteridophyta (iv) gymnosperms and (v) angiosperms.

The first level of classification of plants is based on the presence and absence of well-defined distinct body components. Algae are separated from the rest in having simple and less differentiated thalloid plant body. The next level is based on the absence and presence of vascular tissue (i.e., xylem and phloem). These characters separate bryophyta from rest. Further classification is based on the ability to bear seeds. Pteridophyta do not bear seeds. The gymnosperms have naked seeds whereas angiosperms bear seeds enclosed within the fruits.

Q.19 How are the criteria for deciding division in plants different from criteria for deciding the subgroups among animals?

Ans. The criteria for deciding divisions in plants differs from the criteria for deciding subgroups among animals because of the differences in their basic structure. Plants are divided on the basis of presence or absence of seeds, flowers, differentiation of body and presence or absence of vascular tissues. Animals are divided into subdivisions on the basis of presence or absence of notochord, coelom, gill slits, body segmentation, habitat, etc.

Q.20 Explain how animals in vertebrata are classified into further subgroups.

Ans. The major characters used to classify animals in vertebrata are - (i) kind of exoskeleton or endoskeleton (ii) respiratory organs (iii) the method of reproduction and giving birth to young ones. On the basis of these characteristics the vertebrata is divided into the following classes-

- (i) **Pisces** - exoskeleton of scales, endoskeleton of cartilage or bones, breathing through gills
- (ii) **Amphibia** - slimy skin, breathing through gills in larval stage
- (iii) **Reptilia** - exoskeleton of scales, lay eggs outside the water
- (iv) **Aves** - exoskeleton of feathers, ability to fly, lay eggs
- (v) **Mammalia** - exoskeleton of hair, external ears, give birth to young ones.



EXERCISE – I

BOARD PROBLEMS

VERY SHORT ANSWER-TYPE QUESTION :

- Q.1** In which kingdom will you place an organism which is single-celled, eukaryotic and photosynthetic ?
- Q.2** Which division among plants has the simplest organisms ?
- Q.3** Name the group in which :
(i) Seeds are naked.
(ii) Reproductive organs are flowers.
- Q.4** Name the basic unit of classification.
- Q.5** Name two sub-kingdoms of Kingdom *Plantae*.
- Q.6** Name the smallest taxon.
- Q.7** Give two examples of monocot.
- Q.8** Give two examples of dicot.
- Q.9** Name a group where naked seeds are present.
- Q.10** To which division of Cryptogams do algae belong ?
- Q.11** Name two animals belonging to reptilian class.
- Q.12** The animals belonging to a phylum have segmented body. Name the phylum.
- Q.13** Which is the largest phylum of Kingdom Animalia?
- Q.14** Name the seven basic hierarchical categories.
- Q.15** Mention an organism which exhibits characters of both plants and animals.
- Q.16** In which groups are diploblastic animals found?
- Q.17** Why are frogs not seen in the winter months?
- Q.18** Give one difference between cartilaginous and bony fishes.
- Q.19** Name three flightless birds.
- Q.20** Name the phylum to which the following belong:
(i) Silver fish (ii) Sea horse
(iii) Sea cucumber (iv) Jelly fish
(v) Devil fish (vi) Star fish
(vii) Cray fish

SHORT ANSWER-TYPE QUESTIONS :

- Q.1** Which organisms are called primitive and how are they different from the so-called advanced organisms ?
- Q.2** What is the criterion for classification of organisms as belonging to Kingdom Monera or Protista ?
- Q.3** In the hierarchy of classification, which grouping will have the smallest number of organisms with a maximum of characteristics in common and which will have the largest number of organisms?
- Q.4** How are pteridophytes different from the phanerogams ?
- Q.5** Explain the basis for grouping organisms into five kingdoms.
- Q.6** Name the group of plants that belongs to the division Thallophyta.
- Q.7** How are the seed-bearing plants further classified ?
- Q.8** What is the need of nomenclature ?
- Q.9** Draw a flow-diagram to show the five kingdom classification.
- Q.10** Give two important characters of bony fishes.
- Q.11** What are the four main characteristics of chordates?

LONG ANSWER QUESTION :

- Q.1** Write the distinguishing characters of Kingdom Monera, Kingdom Protista and Kingdom Fungi.
- Q.2** Describe the diagnostic characters of Algae, Fungi and Bryophyta.



FILL IN THE BLANKS :

- Q.1** Five Kingdom classification of living organisms is given by
- Q.2** Basic smallest unit of classification is
- Q.3** Prokaryotes are grouped in kingdom
- Q.4** *Paramoecium* is a protistan because of its
- Q.5** Fungi do not contain
- Q.6** A fungus can be seen without microscope.
- Q.7** Common fungus used in preparing the bread is
- Q.8** Algae and fungi form symbiotic association called
- Q.9** Fungi show mode of nutrition.
- Q.10** Cell wall of fungi is made up of
- Q.11** is considered as 'Father of Zoology'.
- Q.12** The respiration in insects is by
- Q.13** Pore-bearing animals are placed in phylum
- Q.14** Tube feet of echinoderms help in and
- Q.15** The structure which separates the thoracic cavity from abdominal cavity in mammals is
- Q.16** The largest phylum of the kingdom Animalia is
- Q.17** Nematoblasts or stinging cells are characteristic of
- Q.18** Organisms which remain fixed to the bottom of the sea or some other object are called
- Q.19** In urochordates the notochord is confined to the
- Q.20** Birds and are warm-blooded vertebrates.

TRUE OR FALSE :

- Q.1** Mosses have a vascular system.
- Q.2** Ferns are seedless plants.
- Q.3** Fungi reproduce only asexually.
- Q.4** Hornworts and liverworts are pteridophytes.
- Q.5** Conifers are angiosperms.
- Q.6** Bryophytes are distinguished into root, stem and leaves.
- Q.7** Lichen is dual organism which shows association of algae and fungi.
- Q.8** Algae is included in Kingdom Animalia.
- Q.9** Bacteria are prokaryotic.
- Q.10** Female sex organs in bryophytes is called ascogonium.
- Q.11** All the vertebrates are warm-blooded animals.
- Q.12** Duckbilled platypus and spiny ant-eater are egg laying mammals.
- Q.13** Kiwi is the smallest flightless bird.
- Q.14** Snails and slugs have open circulatory system.
- Q.15** Flatworms have true coelom.
- Q.16** Whale is largest fish known.
- Q.17** *Planaria* is free-living aquatic flatworm.
- Q.18** Sponges have a nervous system.
- Q.19** *Hydra* is a fresh water coelenterate.
- Q.20** Crocodiles have four chambered heart.

MATCH THE COLUMN :

- Q.1** Match the items of Column A with items of Column B.

A	B
(a) Naked	(i) Angiosperms
(b) Covered seed	(ii) Gymnosperms
(c) Flagella	(iii) Bryophytes
(d) <i>Marchantia</i>	(iv) <i>Euglena</i>
(e) <i>Marsilea</i>	(v) Thallophyta
(f) <i>Cladophora</i>	(vi) Pteridophyta
(g) <i>Penicillium</i>	(vii) Fungi



Q.2 Match the items of Column A with items of Column B.

Column A

- (i) Flightless bird
- (ii) Egg laying mammal
- (iii) *Hydra*
- (iv) Cnidoblasts
- (v) Pseudocoel
- (vi) *Ascaris*
- (vii) Sea urchin
- (viii) Jawless vertebrate
- (ix) Limbless reptile
- (x) Cartilage fish
- (xi) Leech
- (xii) Millipedes
- (xiii) Nephridia
- (xiv) Pneumatic bones
- (xv) Pouched mammal

Column B

- (a) Echinoderm
- (b) Snake
- (c) Birds
- (d) Endoparasite of intesine
- (e) Ostrich
- (f) Earthworm
- (g) Lamprey
- (h) Shark
- (i) Duckbilled platypus
- (j) Kangaroo
- (k) Coelenterates
- (l) Roundworms
- (m) Segmented arthropods
- (n) Hirudin
- (o) Fresh water coelenterate

ANSWER KEY

VERY SHORT ANSWER QUESTION :

1. Protista
2. Thallophyta
3. (i) Gymnosperm, (ii) Angiosperm
4. Species
5. Cryptogams & Phanerogams
6. Species
7. Rice & Maize
8. Gram & pea
9. Gymnosperm
10. Thallophyta

FILL IN THE BLANKS :

- | | |
|-----------------------------|---------------------------|
| 1. Whittaker | 2. Species |
| 3. Monera nature | 4. Unicellular eukaryotic |
| 5. Chlorophyll | |
| 6. Mushroom | 7. Yeast |
| 8. Lichen | 9. Saprophytic |
| 10. Chitin | 11. Aristotle |
| 12. Tracheae | 13. Porifera |
| 14. Locomotion, Respiration | |
| 15. Diaphragm | 16. Arthropoda |
| 17. Coelenterates | 18. Sessile |
| 19. Tail | 20. Mammals |

WRITE TRUE OR FALSE FOR THE FOLLOWING :

- | | | | |
|-------|-------|-------|-------|
| 1. F | 2. T | 3. F | 4. F |
| 5. F | 6. F | 7. T | 8. F |
| 9. T | 10. F | 11. F | 12. T |
| 13. T | 14. T | 15. F | 16. F |
| 17. T | 18. F | 19. T | 20. T |

MATCH THE FOLLOWING :

1. (a) – (ii), (b) – (i), (c) – (iv), (d) – (iii), (e) – (vi), (f) – (v), (g) – (vii)
2. (i)–e, (ii)–i, (iii)–o, (iv)–k, (v)–l, (vi)–d, (vii)–a, (viii)–g, (ix)–b, (x)–h, (xi)–n, (xii)–m, (xiii)–f, (xiv)–c, (xv)–j



EXERCISE – II

OLYMPIAD QUESTIONS

- Q.1** The smallest taxon is :-
 (A) Class (B) Order
 (C) Species (D) Genus
- Q.2** An organism that can live and grow in presence of oxygen is called :-
 (A) heterotroph (B) Autotroph
 (C) Aerobe (D) Anaerobe
- Q.3** Which of the following is unicellular green alga ?
 (A) *Spirogyra* (B) Fern
 (C) *Cycas* (D) *Chlamydomonas*
- Q.4** Which one of the following represents the non-flowering seeded plants ?
 (A) Pteridophytes (B) Gymnosperms
 (C) Angiosperms (D) Bryophytes
- Q.5** Non-Chlorophyllous heterotrophic plants are :-
 (A) Algae (B) Fungi
 (C) Bryophytes (D) Pteridophytes
- Q.6** Which one of the following is pteridophyte ?
 (A) *Ulothrix* (B) *Rhizopus*
 (C) *Marchantia* (D) Fern
- Q.7** Xylem lacks vessels and phloem lacks companion cells in :-
 (A) Algae (B) Fungi
 (C) Gymnosperms (D) Angiosperms
- Q.8** Which type of food is stored in Fungi ?
 (A) Starch (B) Protein
 (C) Maltose (D) Glycogen
- Q.9** Gymnosperms and angiosperms are included in :-
 (A) Phanerogams (B) Cryptogams
 (C) Thallophytes (D) Prokaryotes
- Q.10** Maize is a :-
 (A) Dicot angiospermic plant
 (B) Monocot angiospermic plant
 (C) Pteridophyte
 (D) Gymnosperm
- Q.11** A branch of biology which deals with the identification, nomenclature and classification of organisms is called :-
 (A) Morphology (B) Ecology
 (C) Taxonomy (D) Phytogeography
- Q.12** Who is known as father of taxonomy ?
 (A) Mendel (B) Linnaeus
 (C) Darwin (D) Crick
- Q.13** Binomial nomenclature was introduced by :-
 (A) John Ray
 (B) A.P. de Candolle
 (C) A.L. de Jussien
 (D) Carolus Linnaeus
- Q.14** Association between Algae and fungi is known as :-
 (A) Bryophyta (B) Lichen
 (C) Pteridophyta (D) None
- Q.15** A group of freely interbreeding organism constitutes a :-
 (A) Species (B) Genera
 (C) Family (D) Class
- Q.16** According to binomial nomenclature, the scientific name of an organism must consists of two words. These are:-
 (A) Species and family
 (B) Genus and species
 (C) Order and family
 (D) Genus and family
- Q.17** Which taxonomic term may be substituted for any rank in the classification ?
 (A) Class (B) Genus
 (C) Species (D) Taxon
- Q.18** Algae belong to :-
 (A) Thallophytes (B) Bryophytes
 (C) Pteridophytes (D) All of the above



- Q.19** Algae are characterized by :-
 (A) Pyrenoids
 (B) Aquatic habit
 (C) Unicellular sex organ
 (D) all of the above
- Q.20** In Whittaker's classification, unicellular organisms are grouped under :-
 (A) Protista (B) Porifera
 (C) Fungi (D) Protozoa
- Q.21** Most common nitrogen fixing cyanobacterium of paddy fields is :-
 (A) *Cylindrospermum* (B) *Aulosira*
 (C) *Oscillatoria* (D) *Nostoc*
- Q.22** Kingdom protista includes :-
 (A) Life cycle showing sporic meiosis
 (B) Life cycle showing zygotic meiosis
 (C) Life cycle showing gametic meiosis
 (D) Both B and C
- Q.23** The term protista was coined by :-
 (A) Haeckel (B) Linnaeus
 (C) Copeland (D) Whittaker
- Q.24** The wall of *Rhizopus* hypha is composed of :-
 (A) Cellulose (B) Chitin
 (C) Pectin (D) Hemicellulose
- Q.25** Yeast and *Penicillium*/penicillin producing fungus are included under :-
 (A) Basidiomycetes (B) Zygomycetes
 (C) Ascomycetes (D) Phycomycetes
- Q.26** The fungus that may cause disease in human beings is :-
 (A) *Puccinia* (B) *Aspergillus*
 (C) *Cystopus* (D) *Rhizopus*
- Q.27** Bryophytes are amphibians because :-
 (A) They require a layer of water for carrying out sexual reproduction
 (B) They occur in damp places
 (C) They are mostly aquatic
 (D) All the above
- Q.28** Pteridophytes differ from bryophytes in possessing :-
 (A) Gametophyte dependent on sporophyte
 (B) Independent gametophyte and sporophyte
 (C) Sporophyte dependent on gametophyte
 (D) No sporophyte
- Q.29** *Azolla*/*Marsilea* is a :-
 (A) *Liverwort* (B) *Moss*
 (C) *Tree fern* (D) *Water fern*
- Q.30** Gymnosperms do not have :-
 (A) Antheridium (B) Ovule
 (C) Archegonium (D) Egg
- Q.31** What is true in a scientific name ?
 (A) Specific name is written first
 (B) Generic name starts with small letter
 (C) Generic name starts with capital alphabet while specific name starts with small letter
 (D) It is written in English
- Q.32** Naked seeds are present in :
 (A) *Pinus* (B) Mango
 (C) Mustard (D) Lemon
- Q.33** Which of the following is a monocot ?
 (A) Carrot (B) Wheat
 (C) Mango (D) Mustard
- Q.34** Which among the following has specialised tissue for conduction of water ?
 (i) Thallophyta (ii) Bryophyta
 (iii) Pteridophyta (iv) Gymnosperms
 (A) (i) and (ii) (B) (ii) and (iii)
 (C) (iii) and (iv) (D) (i) and (iv)



- Q.35** Organisms without nucleus and cell organelles belong to :
- (i) Fungi (ii) Protista
(iii) Cyanobacteria (iv) Archaeobacteria
- (A) (i) and (ii) (B) (iii) and (iv)
(C) (i) and (iv) (D) (ii) and (iii)
- Q.36** Karl Von Linne was involved with which branch of science ?
- (A) Morphology (B) Taxonomy
(C) Physiology (D) Medicine
- Q.37** The 'Origin of Species' is written by :
- (A) Linnaeus (B) Darwin
(C) Haeckel (D) Whittaker
- Q.38** Stem of fern is generally :
- (A) Bulb (B) Rhizome
(C) Runner (D) Corm
- Q.39** In *Pinus*, leaves are
- (A) Flat rhomboidal (B) Flat cordate
(C) Needle-like (D) Scale-like
- Q.40** In angiosperms, megasporophyll is specialised to form :
- (A) Stamen (B) Petal
(C) Carpel (D) Thalamus
- Q.41** Who classified organisms in five kingdom system?
- (A) *Whittaker* (B) *Pliny*
(C) *Aristotle* (D) *Linnaeus*
- Q.42** Which of the following group of animals have cell aggregate body plan ?
- (A) Sponges (B) Platyhelminthes
(C) Nematodes (D) Annelids
- Q.43** Organ system grade of body organization is found in :-
- (A) Sponges (B) Protozoa
(C) Arthropodes (D) Platyhelminthes
- Q.44** Which of the following is incorrectly matched ?
- (A) Porifera - *Sycon*
(B) Coelenterata - *Hydra*
(C) Platyhelminthes - *Fasciola*
(D) Nematoda - *Taenia solium*
- Q.45** Stinging cell organelles - nematocysts are found only in :-
- (A) Phylum - Coelenterata
(B) Phylum - Porifera
(C) Phylum - Echinodermata
(D) Phylum - Arthropoda
- Q.46** In which phylum pseudocoelom is present ?
- (A) Coelenterata (B) Annelida
(C) Aschelminthes (D) Mollusca
- Q.47** Flatworms are found in :-
- (A) Phylum - Nematoda
(B) Phylum - Annelida
(C) Phylum - Platyhelminthes
(D) Phylum - Echinodermata
- Q.48** Star fish is the member of :-
- (A) Pisces (B) Mollusca
(C) Coelenterata (D) Echinodermata
- Q.49** *Balanoglossus* is an example of :-
- (A) Urochordata (B) Cephalochordata
(C) Hemichordata (D) Vertebrata
- Q.50** Which of the following is not a bony fish ?
- (A) *Labeo rohita* (B) *Anabas*
(C) *Hippocampus* (D) *Chimera*
- Q.51** Which statement is not correct for amphibians?
- (A) These are first vertebrate which come out of water
(B) They are cold-blood animals
(C) They do not have scales on their skin
(D) They have two chambered heart



- Q.52** Which class includes *snakes* and *lizards* ?
 (A) Amphibia (B) Reptilia
 (C) Mammalia (D) Pisces
- Q.53** In which class birds are included ?
 (A) Amphibia (B) Pisces
 (C) Reptilia (D) Aves
- Q.54** Sound producing organ in birds is :-
 (A) Trachea (B) Pneumatic bones
 (C) Syrinx (D) Plumage
- Q.55** Which statement(s) is (are) true for mammals?
 (A) They are warm blooded animals
 (B) They have diaphragm
 (C) They have mammary glands for baby feeding
 (D) All of the above
- Q.56** In Earthworm the body is divisible into :
 (A) 30-35 segments
 (B) 70-75 segments
 (C) 90-100 segments
 (D) 100-120 segments
- Q.57** Earthworm has an unsegmented band called :
 (A) Clitellum (B) Cephalothorax
 (C) Thorax (D) metathorax
- Q.58** Clitellum occur in segments :
 (A) 8-10 (B) 10-12
 (C) 14-16 (D) 16-18
- Q.59** Setae occur all over the body except segments:
 (A) First (B) Last
 (C) Clitellar (D) All the above
- Q.60** Earthworm belongs to phylum :
 (A) Annelida (B) Arthropoda
 (C) Nematoda (D) Mollusca.
- Q.61** Earthworm has characteristic of annelida :
 (A) True coelom
 (B) Metameric segmentation
 (C) Both A and B
 (D) Open circulatory system
- Q.62** Cockroach has a pair of long jointed thread-like apendages over the head. They are :
 (A) Antennae (B) Anal styles
 (C) Anal cerci (D) Prolegs.
- Q.63** Male cockroach can be distinguished from the female in possession of :
 (A) Anal cerci (B) Anal styles
 (C) No wings (D) Spiracles
- Q.64** Mouth parts of Cockroach are of type :
 (A) Biting and chewing
 (B) Piercing and sucking
 (C) Siphoning
 (D) Sponging.
- Q.65** Cockroach is :
 (A) Carnivorous (B) Herbivorous
 (C) Omnivorous (D) Saprophagous
- Q.66** The major characteristics of arthropods are :
 (A) Jointed apendages and chitinous exoskeleton
 (B) Jointed appendages and chitinous endoskeleton
 (C) Antennae and cephalothroax
 (D) Eyes and Cephalothorax
- Q.67** Bony fish can stay in water at any depth without any effort due to presence of :
 (A) Air bladder (B) Lungs
 (C) Gills (D) Powerful tail
- Q.68** Body of the bony fish does not show gills as they are covered by :
 (A) Scales (B) Operculum
 (C) Fins (D) Skin



Q.69 Fins help the fish in :

- (A) Locomotion
(B) Steering
(C) Both A and B
(D) None of these

ANSWER KEY

Q.70 An important character of chordata is presence of :

- (A) Dorsal notochord
(B) Dorsal hollow nerve cord
(C) Post anal tail
(D) All the above

Q.71 The body of a bird is covered by :

- (A) Dermal scales (B) Feathers
(C) Hair (D) Both B and C

Q.72 Flight adaptation of bird is :

- (A) Stream lined body
(B) Feathery covering
(C) Wings
(D) All the above

Q.73 Number of teeth found in a beak of bird is :

- (A) Several (B) 20
(C) 10 (D) Nil

Q.74 Birds have kept their weight low due to presence of :

- (A) Streamlined body
(B) Pneumatic bones
(C) Small tail
(D) Enclosing air in feathers

Q.75 Earthworm is used in :

- (A) Metabolising nitrogenous wastes
(B) Composting of organic matter
(C) Ploughing soil
(D) Both B and C

1.	C	2.	C	3.	D	4.	B
5.	B	6.	D	7.	C	8.	D
9.	A	10.	B	11.	C	12.	B
13.	D	14.	B	15.	A	16.	B
17.	D	18.	A	19.	D	20.	A
21.	B	22.	D	23.	A	24.	B
25.	C	26.	B	27.	A	28.	B
29.	D	30.	C	31.	C	32.	A
33.	B	34.	C	35.	B	36.	B
37.	B	38.	B	39.	C	40.	C
41.	A	42.	A	43.	C	44.	D
45.	A	46.	C	47.	C	48.	D
49.	C	50.	D	51.	D	52.	B
53.	D	54.	C	55.	D	56.	D
57.	A	58.	C	59.	D	60.	A
61.	C	62.	A	63.	B	64.	A
65.	C	66.	A	67.	A	68.	B
69.	C	70.	D	71.	B	72.	D
73.	D	74.	B	75.	D		



EXERCISE – III

NTSE / ISO / IJO QUESTIONS

1. In Earthworm the body is divisible into :
 (A) 30-35 segments (B) 70-75 segments
 (C) 90-100 segments (D) 100-120 segments
2. Earthworm has an unsegmented band called :
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3. Clitellum occur in segments :
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 (C) 14-16 (D) 16-18
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7. Cockroach has a pair of long jointed thread-like appendages over the head. They are :
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 (B) Piercing and sucking
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10. Cockroach is :
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11. The major characteristics of arthropods are :
 (A) Jointed apendages and chitinous exoskeleton
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 (D) Eyes and Cephalothorax
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 (C) Gills (D) Powerful tail
13. Body of the bony fish does not show gills as they are covered by :
 (A) Scales (B) Operculum
 (C) Fins (D) Skin
14. Fins help the fish in :
 (A) Locomotion (B) Steering
 (C) Both A and B (D) None of these
15. An important character of chordata is presence of :
 (A) Dorsal notochord (B) Dorsal hollow nerve cord
 (C) Post anal tail (D) All the above
16. The body of a bird is covered by :
 (A) Dermal scales (B) Feathers
 (C) Hair (D) Both B and C
17. Flight adaptation of bird is :



- (A) Stream lined body
(B) Feathery covering
(C) Wings (D) All the above
- 18.** Number of teeth found in a beak of bird is :
(A) Several (B) 20
(C) 10 (D) Nil
- 19.** Birds have kept their weight low due to presence of :
(A) Streamlined body (B) Pneumatic bones
(C) Small tail
(D) Enclosing air in feathers
- 20.** Earthworm is used in :
(A) Metabolising nitrogenous wastes
(B) Composting of organic matter
(C) Ploughing soil
(D) Both B and C
- 21.** Most common nitrogen fixing cyanobacterium of paddy fields is :-
(A) *Cylindrospermum* (B) *Aulosira*
(C) *Oscillatoria* (D) *Nostoc*
- 22.** Kingdom protista includes :-
(A) Life cycle showing sporic meiosis
(B) Life cycle showing zygotic meiosis
(C) Life cycle showing gametic meiosis
(D) Both B and C
- 23.** The term protista was coined by :-
(A) Haeckel (B) Linnaeus
(C) Copeland (D) Whittaker
- 24.** The wall of Rhizopus hypha is composed of :-
(A) Cellulose (B) Chitin
- (C) Pectin (D) Hemicellulose
- 25.** Yeast and Penicillium/penicillin producing fungus are included under :-
(A) Basidiomycetes (B) Zygomycetes
(C) Ascomycetes (D) Phycomycetes
- 26.** The fungus that may cause disease in human beings is :-
(A) *Puccinia* (B) *Aspergillus*
(C) *Cystopus* (D) *Rhizopus*
- 27.** Bryophytes are amphibians because :-
(A) They require a layer of water for carrying out sexual reproduction
(B) They occur in damp places
(C) They are mostly aquatic
(D) All the above
- 28.** Pteridophytes differ from bryophytes in possessing :-
(A) Gametophyte dependent on sporophyte
(B) Independent gametophyte and sporophyte
(C) Sporophyte dependent on gametophyte
(D) No sporophyte
- 29.** Azolla/Marsilea is a :-
(A) *Liverwort* (B) *Moss*
(C) *Tree fern* (D) *Water fern*
- 30.** Gymnosperms do not have :-
(A) Antheridium (B) Ovule
(C) Archegonium (D) Egg
- 31.** What is true in a scientific name ?
(A) Specific name is written first



- (B) Generic name starts with small letter
- (C) Generic name starts with capital alphabet while specific name starts with small letter
- (D) It is written in English
- 32.** Naked seeds are present in :
- (A) *Pinus* (B) Mango
- (C) Mustard (D) Lemon
- 33.** Which of the following is a monocot ?
- (A) Carrot (B) Wheat
- (C) Mango (D) Mustard
- 34.** Which among the following has specialised tissue for conduction of water ?
- (i) Thallophyta (ii) Bryophyta
- (iii) Pteridophyta (iv) Gymnosperms
- (A) (i) and (ii) (B) (ii) and (iii)
- (C) (iii) and (iv) (D) (i) and (iv)
- 35.** Organisms without nucleus and cell organelles belong to :
- (i) Fungi (ii) Protista
- (iii) Cyanobacteria (iv) Archaeobacteria
- (A) (i) and (ii) (B) (iii) and (iv)
- (C) (i) and (iv) (D) (ii) and (iii)
- 36.** Karl Von Linne was involved with which branch of science ?
- (A) Morphology (B) Taxonomy
- (C) Physiology (D) Medicine
- 37.** The 'Origin of Species' is written by :
- (A) Linnaeus (B) Darwin
- (C) Haeckel (D) Whittaker
- 38.** Stem of fern is generally :
- (A) Bulb (B) Rhizome
- (C) Runner (D) Corm
- 39.** In *Pinus*, leaves are
- (A) Flat rhomboidal (B) Flat cordate
- (C) Needle-like (D) Scale-like
- 40.** In angiosperms, megasporophyll is specialised to form :
- (A) Stamen (B) Petal
- (C) Carpel (D) Thalamus

ANSWER KEY

- | | | | | | | | |
|------------|---|------------|---|------------|---|------------|---|
| 1. | D | 2. | A | 3. | C | 4. | D |
| 5. | A | 6. | C | 7. | A | 8. | B |
| 9. | A | 10. | C | 11. | A | 12. | A |
| 13. | B | 14. | C | 15. | D | 16. | B |
| 17. | D | 18. | D | 19. | B | 20. | D |
| 21. | B | 22. | D | 23. | A | 24. | B |
| 25. | C | 26. | B | 27. | A | 28. | B |
| 29. | D | 30. | C | 31. | C | 32. | A |
| 33. | B | 34. | C | 35. | B | 36. | B |
| 37. | B | 38. | B | 39. | C | 40. | C |

